PB89-204747

Superfund Record of Decision (EPA Region 1)
Landfill and Resource Recovery, Rhode Island
(First Remedial Action), September 1988

(U.S.) Environmental Protection Agency, Washington, DC

29 Sep 88

U.S. Department of Commerce
National Technical Information Service
[redacted]

PB89-204747

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R01-88/032
September 1988

EPA

Superfund Record of Decision:

Landfill & Resource Recovery, RI

REPRODUCED BY
U.S. DEPARTMENT OF COMMERCE
NATIONAL TECHNICAL INFORMATION SERVICE
SPRINGFIELD, VA. 22161

50272-101

REPORT DOCUMENTATION PAGE	**1. REPORT NO.** EPA/ROD/R01-88/032	**2.**	**3. Recipient's Accession No.**

4. Title and Subtitle

SUPERFUND RECORD OF DECISION
Landfill & Resource Recovery, RI
First Remedial Action - Final

5. Report Date 09/29/88

6.

7. Author(s)

8. Performing Organization Rept. No.

9. Performing Organization Name and Address

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C)
(G)

12. Sponsoring Organization Name and Address

U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

13. Type of Report & Period Covered 800/000

14.

15. Supplementary Notes

(and)

16. Abstract (Limit: 200 words)

The Landfill & Resource Recovery (L&RR) site is located in North Smithfield, Rhode Island, and consists of a 28-acre landfill and a sand and gravel pit. Several unnamed streams lie to the south and east of the site and flow through wetlands located adjacent to the site area. Several homes near the site use ground water for drinking, and the Statesville reservoir, used for recreational activities, is located approximately 0.5 mile from the site. The L&RR site is a former sand and gravel pit that began accepting domestic, commercial, and industrial wastes in 1927. Site owners claim the hazardous materials were mixed in with municipal refuse and deposited in the north-central area of the site, but other reports indicate hazardous waste was spread over the entire site area. When hazardous waste disposal ceased in 1979 the owners placed a PVC cover over the north-central area to prevent stormwater infiltration. Commercial and domestic wastes were disposed of on top of and around the area in subsequent years. In 1983, the Rhode Island Department of Health installed monitoring wells onsite to ensure compliance with State regulations, and based on sampling results, ordered the site closed. Upon final closure in 1985 the owners covered 80 percent of the landfill area with one foot of sand, another synthetic cover and topsoil. Eighteen gas vents were installed to vent gases underlying the synthetic cover. The sand used as (See Attached Sheet)

17. Document Analysis a. Descriptors

Record of Decision
Landfill & Resource Recovery, RI
First Remedial Action - Final
Contaminated Media: air
Key Contaminants: hydrogen sulfide, methane, VOCs (benzene, PCE, TCE, toluene)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	**19. Security Class (This Report)** None	**21. No. of Pages** 118
	20. Security Class (This Page) None	**22. Price** PC$21.95/MF $6.95

(See ANSI-Z39.18)

See Instructions on Reverse

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

EPA/ROD/R01-88/032
Landfill & Resource Recovery, RI
First Remedial Action - Final

16. ABSTRACT (continued)

final cover has eroded into the adjacent wetlands, but sampling indicated no contamination was present. Low levels of VOCs and metals including lead, cadmium, and arsenic were discovered in downgradient ground water samples, but levels were sporatic and all were below MCLs. This remedial action will upgrade the existing landfill enclosure to protect ground water and wetlands, implement wetlands recovery operations, and collect and treat landfill gas to reduce risks to public health from inhalation. Primary contaminants of concern affecting the air are hydrogen sulfide and methane gases contaminated with VOCs including benzene, toluene, PCE, and TCE.

The selected remedial action for this site includes: access restrictions; stabilization of the steep side slopes of the landfill and installation of a RCRA cap over the entire landfill, with revegetation; collection and thermal destruction of underlying gases, the method of thermal destruction to be determined in design; excavation of eroded landfill sand from the wetlands, with replacement onsite, and vegetation of excavated wetland areas; and ground water and air monitoring. The estimated present worth cost of the selected remedy is between $5,674,000 and $6,790,000, depending on the particular method of slope remediation and thermal destruction chosen. O&M costs were not provided.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

RECORD OF DECISION

Landfill & Resource Recovery (L&RR) Site
North Smithfield, Rhode Island

STATEMENT OF PURPOSE

This Decision Document represents the selected remedial action for the Landfill & Resource Recovery (L&RR) Site developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Contingency Plan (NCP) 40 CFR Part 300 et seq., 47 Federal Register 31180 (July 16, 1982), as amended. The Region I Administrator has been delegated the authority to approve this Record of Decision.

The State of Rhode Island has concurred with the components of the selected remedy which are consistent with the 1983 Court Order and Consent Agreement between the Rhode Island Department of Environmental Management (RIDEM) and Landfill & Resource Recovery (L&RR), Inc. In regards to the additional requirements established by EPA, the State of Rhode Island recognizes that these requirements are not inconsistent with the 1983 Court Order and provide additional protection. The State of Rhode Island has also determined, through a detailed evaluation, that the selected remedy is consistent with Rhode Island laws and regulations.

STATEMENT OF BASIS

This decision is based on the administrative record which was developed in accordance with Section 113(k) of CERCLA and which is available for public review at the North Smithfield Municipal Annex Building and the EPA Region I Waste Management Division Records Center in Boston. The attached index identifies the items which comprise the administrative record upon which the selection of the remedial action is based.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy has four major components which together form a comprehensive approach to Site remediation.

1. Upgrading the Landfill Closure

The existing landfill closure will be upgraded to protect the groundwater, to protect the wetlands and to meet ARARs. Upgrading the landfill closure includes installing a fence; developing a post-closure monitoring plan; upgrading the surface water runoff management system; stabilizing the steep side slopes and installing a synthetic cover on the uncovered northeast area of the landfill; establishing a cover thickness of 24 inches; and establishing vegetation. The synthetic cover will protect the groundwater by minimizing infiltration. Upgrading the existing surface water management system, stabilizing the steep side slopes and establishing vegetation will protect the wetlands by minimizing erosion. All of the components contribute to the remedy attaining ARARs.

Two alternatives have been selected for stabilizing the steep slopes. The specific alternative will be selected during the design phase of the remedial action after slope stability tests are conducted.

2. Gas Collection and Thermal Destruction

The landfill gas will be treated to reduce the potential risks to public health from inhalation of the landfill vent emissions. The existing landfill vents will be utilized to collect the landfill gas. These vents will be manifolded by a subsurface piping system which will direct the gaseous emissions to the treatment system.

Three thermal destruction technologies have been selected to treat the gaseous emissions: combustion, flaring and incineration. All of these technologies burn the landfill gas to destroy the hazardous constituents. Typically, these technologies can destroy between 90% and 99% of the contaminants in the gas that enters the system. The specific technology to be utilized for thermal destruction will be chosen by EPA during the design phase after pilot tests have been conducted to insure that the remedy is protective.

3. Wetlands Remediation

During the Remedial Investigation, two areas of the wetlands were identified as needing remediation due to cover material erosion and subsequent sedimentation. In these areas, the sand which has eroded from the landfill will be excavated and the wetlands will be revegetated. Since the eroded sand is not contaminated, the excavated sediment can be redeposited on-site. To promote wetland revegetation, soils similar to those of the natural wetland will be placed, and sedges and others species will be planted. During revegetation, the natural contour of the wetland will be restored to maintain the easterly flow of the creek toward the main wetland body. Additional areas may be defined during the design phase if erosion has caused further damage since the RI was conducted.

4. Site Monitoring

To insure that the remedy remains protective, both the groundwater and the air will be monitored periodically for thirty years. The existing network of wells plus one new well cluster will be monitored on a quarterly basis for a number of constituents that were selected based on site specific information. The monitoring results will be reviewed on a periodic basis to determine if a variation indicative of a plume is present.

The air monitoring program will depend on the specific technology chosen for gas treatment. This plan will be outlined during the design phase and will specify the monitoring locations, the sampling technique, the indicator parameters and frequency of monitoring. Depending on the technology, this plan may include ambient air monitoring and emissions testing to insure that the system is protecting public health and the environment.

DECLARATION

The selected remedy is protective of human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate and is cost-effective. This remedy partially satisfies the statutory preference for treatment that permanently and significantly reduces the volume, toxicity and mobility of the hazardous substances, pollutants and contaminants, as a principal element. Finally, it is determined that this remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

9/29/88
Date

Michael R. Deland
Michael R. Deland
Regional Administrator

LANDFILL & RESOURCE RECOVERY SITE
Record of Decision Summary

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I. SITE NAME, LOCATION AND DESCRIPTION

The Landfill and Resource Recovery (L&RR) Site ("the Site") is a closed landfill in the Town of North Smithfield, Rhode Island that historically received domestic, commercial and industrial wastes. The landfill covers approximately 28 acres of a 36 acre parcel of land owned by Landfill and Resource Recovery (L&RR), Inc. The Site is located on Oxford Turnpike, northwest of Pound Hill Road (see Figure I-1: Site Location Map).

The landfilled area extends from the edge of Oxford Turnpike on the west, to within 50 feet of the property line on the north and east, and to within 100 feet of an intermittent unnamed stream on the south. The Site is located in a rural area primarily surrounded by woodlands. A sand and gravel pit exists south of the landfill, on property also owned by L&RR, Inc. Three unnamed streams exist south and east of the Site. These streams flow through wetlands, also located south and east of the Site, and discharge into Trout Brook. Trout Brook flows north for about 2000 feet to Trout Brook Pond which discharges into the Slatersville Reservoir. The Slatersville Reservoir and Trout Brook are Class B water bodies suitable for fishing, swimming and other recreational purposes.

There are several homes near the landfill that have private wells and use groundwater as a source of drinking water. These homes are located on Oxford Turnpike, Pound Hill Road and other nearby roads. The closest residence is approximately 1200 feet southeast of the landfill, on Pound Hill Road (see Figure I-2: Site Layout Plan). The landfill is located over the Slatersville Aquifer which has been designated as a drinking water source by the State of Rhode Island.

The Site is a former sand and gravel pit that reportedly began accepting wastes for disposal around 1927. The Site owners claim that the hazardous materials were co-disposed with the municipal wastes in the north-central area of the Site. Other reports received by EPA have stated that the hazardous waste were co-disposed with municipal wastes throughout the Site. Consequently, EPA does not know the full areal extent of historical hazardous waste disposal. When hazardous waste disposal ceased, the so called "hazardous waste area", as defined by the owners, was covered with a synthetic cover made of 20-mil poly vinyl chloride (PVC). This action was conducted by a company under contract to L&RR, Inc., and was intended to reduce infiltration of rain and melted snow into the waste. After this action, the landfill continued operation placing commercial and domestic waste on top of and around this area. When the landfill was closed by the owner, the landfill was graded and covered with approximately a foot of sand and another synthetic cover. This synthetic cover was placed over approximately 80% of the landfill. Additional soil was placed on this cover to establish vegetation. The side slopes are steep, ranging from slopes of 3:1 to slopes of 2:1.

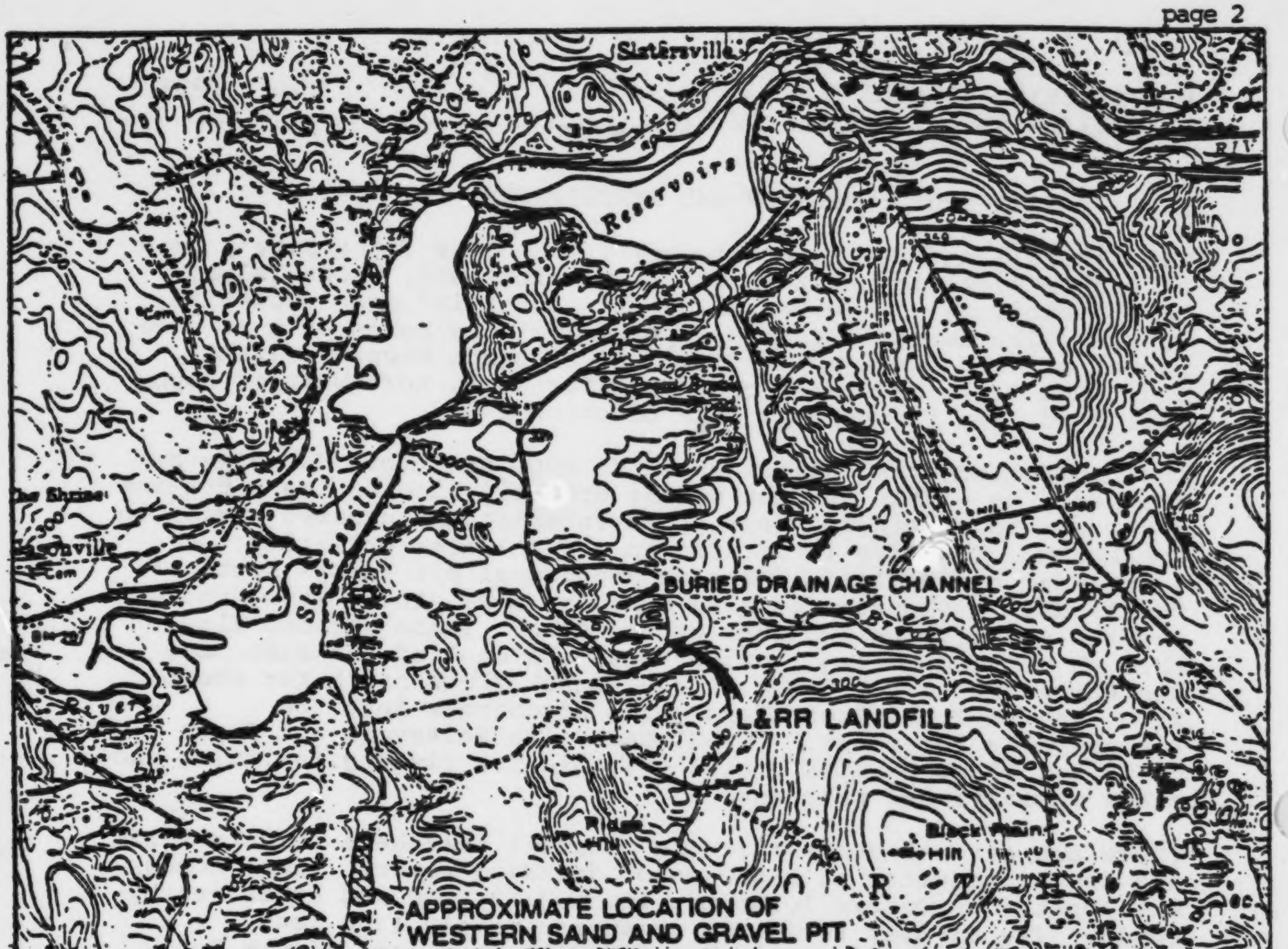
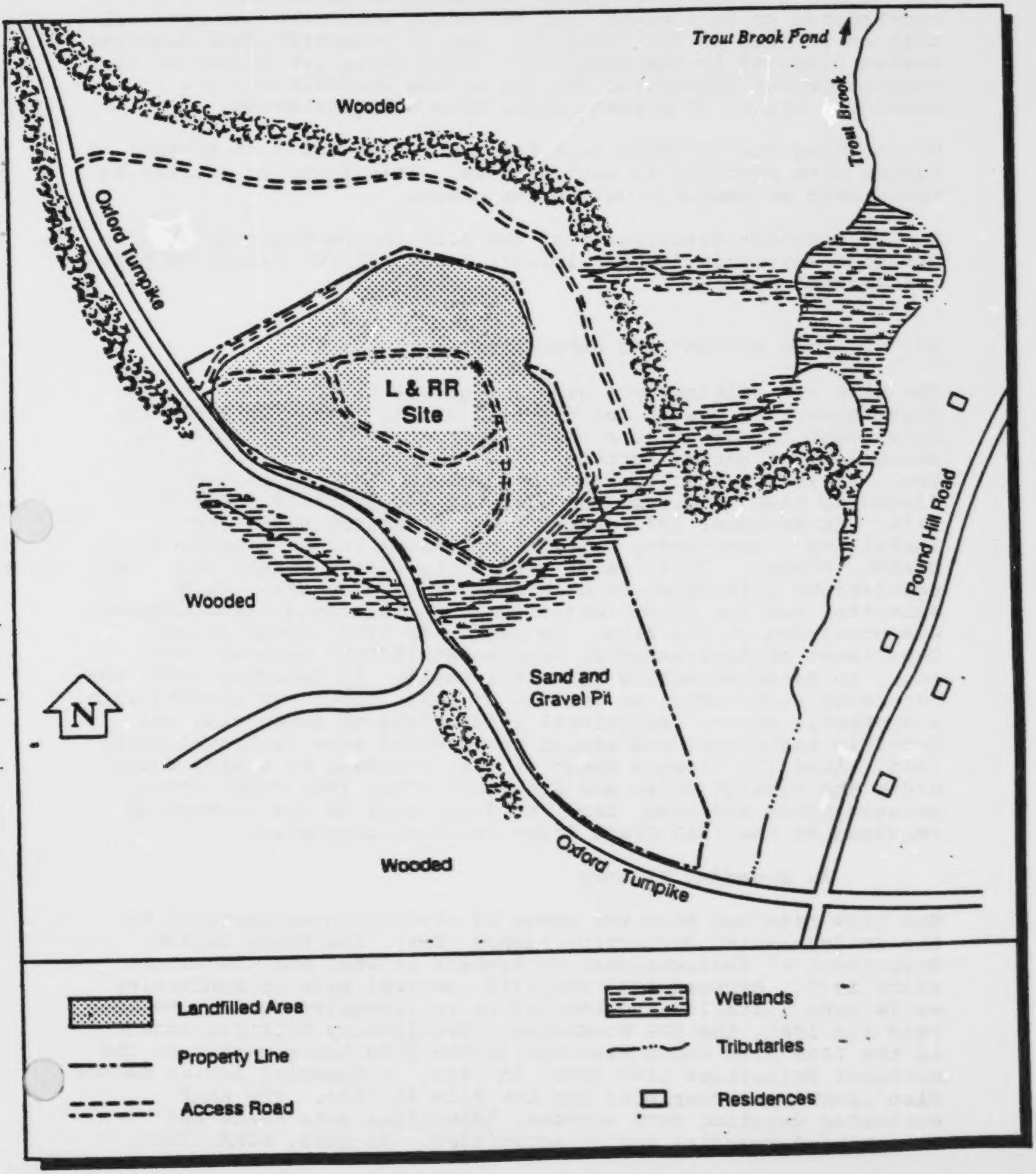

Slatersville
Reservoirs
Our Shrine
Nasonville
Slatersville
River
BURIED DRAINAGE CHANNEL
L&RR LANDFILL
Black Plain Hill
APPROXIMATE LOCATION OF WESTERN SAND AND GRAVEL PIT
Oak Valley
Tarkiln Pond
Den Hill
Cat Hill
Tarkiln
Nichols Pond
0
2000
4000 FEET
N

Figure I-1
SITE LOCATION MAP
L & RR SITE
NORTH SMITHFIELD, RHODE ISLAND

SOURCE: U.S.G.S. GEORGIAVILLE, R. I., 7.5 MINUTE TOPOGRAPHIC MAP

Figure I-2
Site Layout Plan


Trout Brook Pond
Wooded
Trout Brook
Oxford Turnpike
L & RR Site
Pound Hill Road
Wooded
Sand and Gravel Pit
N
Wooded
Oxford Turnpike
Landfilled Area
Property Line
Access Road
Wetlands
Tributaries
Residences

The landfill contains 18 landfill gas vents which were constructed to vent gases from below the synthetic cap and soil that cover most of the landfill. Gas is generated from decaying wastes disposed in the landfill. These vents are installed at varying depths throughout the top of the landfill and are currently closed to prevent gases from being released.

Surrounding the landfill is a fence which consists of strands of barbed wire attached to wooden posts. This fence is similar to those used to restrain cattle and horses.

A more complete description of the Site can be found in the Remedial Investigation/Feasibility Study (RI/FS) Report on pages 2-1 through 2-7.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Site was originally a sand and gravel pit that reportedly began accepting wastes for disposal around 1927. In 1969, the Site began operation as a solid waste disposal area under the management of Harvey Fortune. This operation was sold to L&RR, Inc., in 1974. A Solid Waste Management Facility licence was issued to L&RR, Inc., by the State of Rhode Island in December 1976. In November 1977, L&RR, Inc., submitted plans for installing 7 monitoring wells to the Rhode Island Department of Health (RIDOH). These wells were installed to comply with State regulations pertaining to hazardous waste disposal. This submittal was the first indication that hazardous waste disposal was occurring at the Site. In September 1979, Rhode Island Department of Environmental Management (RIDEM) ordered L&RR, Inc., to cease accepting hazardous waste. In December 1979, the hazardous waste area, as defined by L&RR, Inc., was covered with a synthetic cover. Additional landfilling of commercial and domestic waste over and around the covered area continued until 1985. Landfill closure began in 1985 pursuant to a 1983 Court Order and Consent Order and Agreement ("the 1983 Court Order") between RIDEM and L&RR, Inc. To date, most of the closure as required by the 1983 Court Order has been completed.

A. Remedial History

The L&RR Site has been the focus of several investigations by the Environmental Protection Agency (EPA), the Rhode Island Department of Environmental Management (RIDEM) and the owners since 1977. Between 1977 and 1980, several sets of monitoring wells were installed and sampled on an irregular basis. Between 1980 and 1981, the EPA conducted a Preliminary Site Assessment of the L&RR Site which resulted in the Site being ranked on the National Priorities List (NPL) in 1982. A Remedial Action Master Plan (RAMP) was completed for the Site in 1983. The RAMP evaluated existing data sources, identified data needs and recommended remedial action activities. In 1985, L&RR, Inc., began to close the landfill under a Court Order and Consent Order and Agreement with RIDEM. EPA was not a party to that Court Order and began a federally funded RI/FS in May 1986. A more detailed description of the Site history can be found in the RI/FS Report on pages 1-3 through 1-9.

B. Enforcement History

A number of enforcement actions have been taken against L&RR, Inc., by RIDEM. On September 6, 1979, RIDEM ordered L&RR, Inc., to cease accepting and disposing hazardous wastes. The landfill continued accepting commercial and domestic wastes. On December 1, 1980, the L&RR Solid Waste Management Facility license was up for renewal. L&RR, Inc., filed a renewal application and continued operation. On October 30, 1981, RIDEM ordered L&RR, Inc., to cease accepting all wastes and to close the northern section of the landfill where the hazardous waste was allegedly disposed. On November 9, 1981, L&RR ceased operating for a three week period and appealed the RIDEM order. On December 28, 1981, the RI Superior Court issued an order staying the enforcement and effect of the RIDEM order and allowing the landfill to continue operating. Based on new monitoring information, RIDEM issued another order to close the landfill. In January 1982, the RI Superior Court found RIDEM in contempt of the December 28 order and allowed L&RR to continue operations. On July 13, 1983, RIDEM and L&RR, Inc., entered into a Consent Order and Agreement which set forth terms and conditions governing the continued operation and eventual closure of the landfill. This Consent Order and Agreement was approved by the Superior Court for the State of Rhode Island and is referred to in the remainder of this document as "the 1983 Court Order." The landfill ceased operating in January 1985.

In June 1983, L&RR, Inc., requested that EPA accept the reports and plans developed under the 1983 Court Order as fulfilling the requirements of an RI/FS. EPA reviewed and commented on the 1983 Court Order and plans but did not accept them as fulfilling the requirements of an RI/FS consistent with the National Contingency Plan (NCP). Consequently, during 1983 and 1984, EPA conducted numerous negotiations with L&RR, Inc. As a result of these negotiations, EPA sent L&RR, Inc., a proposed consent order on November 24, 1984 for concurrence. This consent order would have allowed L&RR, Inc., to submit the data collected under the 1983 Court Order supplemented by additional investigations and studies required by EPA to fulfill the requirements of an RI/FS consistent with the NCP. L&RR, Inc., failed to respond and concur with EPA's proposed consent order. On January 29, 1985, EPA notified L&RR, Inc., that the Agency was withdrawing from the process of negotiating a formal agreement with L&RR, Inc., regarding the RI/FS.

On June 5, 1986, EPA notified L&RR, Inc., of their potential liability with respect to the Site. On July 29, 1988, EPA sent a notice letter to L&RR, Inc., which formally demanded reimbursement for past costs; requested information regarding activities at the Site; and, requested voluntary participation in undertaking forthcoming remedial activities.

On July 29, 1988, EPA also notified additional parties who either generated wastes that were shipped to the facility, arranged for the disposal of wastes at the facility, or transported wastes to the facility, of their potential liability with respect to the Site. EPA expects to carry out negotiations with the PRPs for conducting the remedial activities.

EPA's formal comment period on the Proposed Plan, which describes EPA's preferred remedy as well as the other alternatives considered for the Site in the FS, was from July 20 through September 2, 1988. An extended comment period, six weeks rather than the required three weeks, was held to allow additional time for the Potentially Responsible Parties (PRPs) to participate in the remedy selection process. Comments presented by the PRPs during the public comment period are included in the Administrative Record. A summary of these comments as well as EPA's response, which describes how these comments affected the remedy selection, are included in the Responsiveness Summary in this document.

III. COMMUNITY RELATIONS

Throughout the Site's history, community concern and involvement has been moderate to high. The community was particularly active in the late 70's and early 80's and repeatedly sought to close the landfill. Other concerns expressed by the community include contamination of the Slatersville Aquifer; development, growth and property values in the community; and, potential health effects caused by exposure to the Site. EPA has kept the community and other interested parties apprised of the Site activities through informational meetings, fact sheets, press releases and public meetings.

In 1983, EPA released a community relations plan which outlined a program to address community concerns and keep citizens informed about and involved in remedial activities. This plan was revised in October 1986 and on January 7, 1987, EPA held an informational meeting in the Municipal Anex Building in North Smithfield, RI to describe the plans for the RI/FS.

On July 19, 1988, EPA held an informational meeting to discuss the results of the RI, the alternatives presented in the FS and EPA's preferred alternative. This information was summarized and published in EPA's Proposed Plan, July 1988. The Proposed Plan was distributed to people on EPA's mailing list and other interested people at the meeting. Also during this meeting, the

Agency responded to questions from the public. From July 20 to September 2, 1988, the Agency held a six week public comment period to accept public comment on the alternatives presented in the FS and the Proposed Plan and on any other documents previously released to the public. On August 10, 1988, the Agency held a formal public hearing to accept any oral comments. A summary of the comments submitted and the Agency's response to comments are included in the Responsiveness Summary of this document.

IV. SCOPE OF RESPONSE ACTION

The selected remedy has four major components which together comprise a comprehensive approach for Site remediation. In summary, the remedy consists of the following components: upgrading the existing landfill closure; constructing a gas collection and thermal destruction system to treat the landfill gas; remediating the impacted wetlands; and monitoring the Site. The selected remedy will reduce the principal threats posed by the Site. Gaseous emissions from the landfill pose the principal threat to human health at the Site. The gas collection and thermal destruction system will reduce this threat. The sand eroding from the landfill poses a principal threat to the environment. Specifically, the sand is filling in wetlands that surround the Site. Upgrading the landfill closure will reduce this threat as well as the potential threat to groundwater from infiltration of rain and melted snow. The impacted wetlands will be remediated. Site monitoring will insure that the selected remedy remains protective of human health and the environment.

V. SITE CHARACTERISTICS

The RI consisted of evaluating existing data and gathering additional data needed to characterize the Site. Additional data was gathered for the following media: air, groundwater, subsurface soils, surface water, and surface water sediments. The significant findings of the Remedial Investigation are summarized below. A complete discussion of the Site characteristics can be found in Sections 7 and 8 of the RI/FS Report.

A. Air

During the RI, the 18 landfill vents were opened and the emissions were evaluated to determine the landfill's impact on air quality. The vents were sampled and found to be releasing methane and hydrogen sulfide gas contaminated with a variety of volatile organic compounds (VOCs). Five of the 18 vents contained significantly higher concentrations of VOCs. The locations of these vents (12, 13, 15, 17 and 18) were coincident with the proximate area where hazardous waste was disposed (see Figure V-1: Location of Landfill Vents).

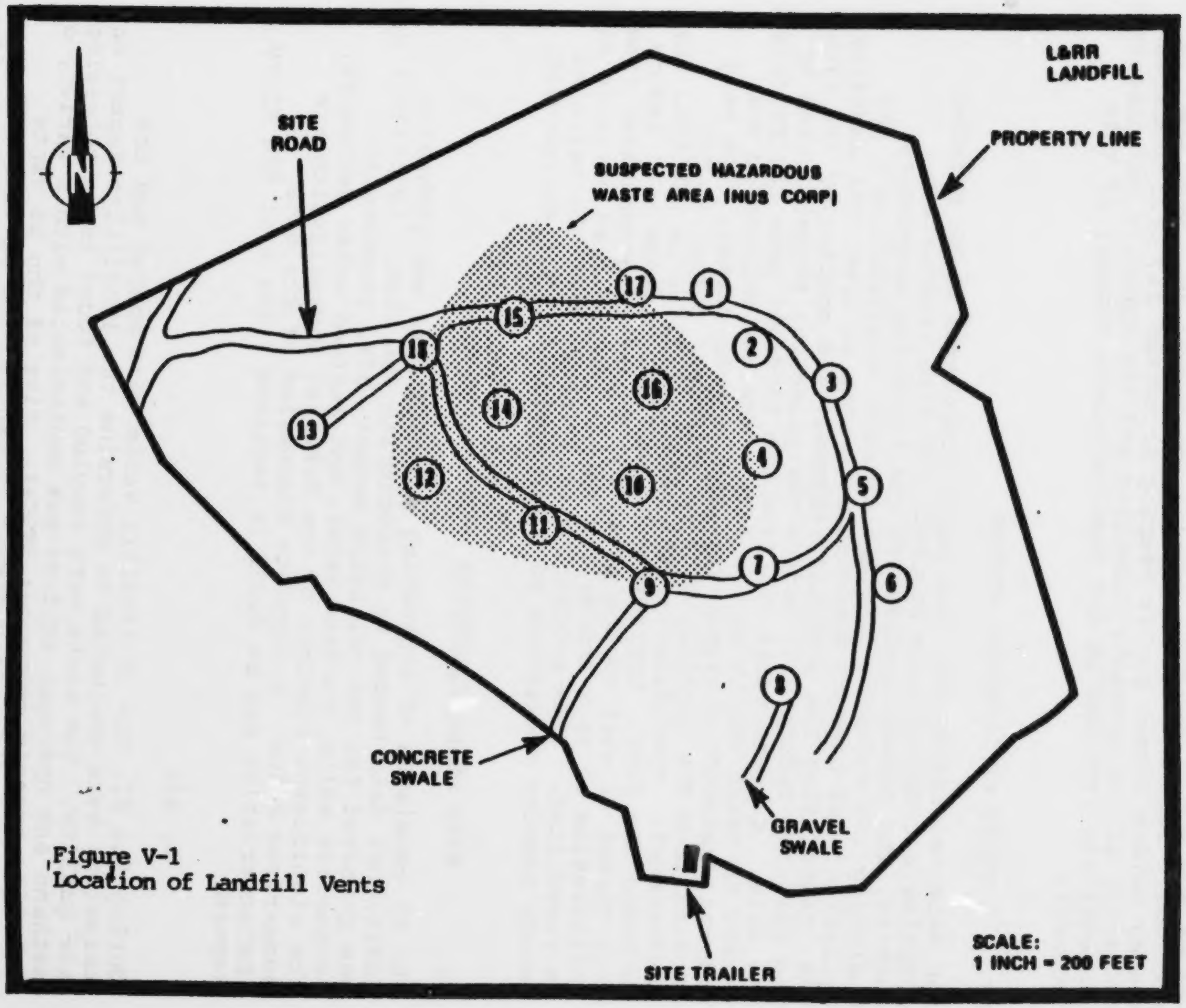

L&RR
LANDFILL
PROPERTY LINE
SITE
ROAD
SUSPECTED HAZARDOUS
WASTE AREA (NUS CORP)
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
CONCRETE
SWALE
GRAVEL
SWALE
SITE TRAILER
SCALE:
1 INCH = 200 FEET
N

Figure V-1
Location of Landfill Vents

Samples of the air were also taken at locations above the portion of the landfill that is not covered by the synthetic cap. These results indicated that methane and hydrogen sulfide gas contaminated with VOCs are also released from the uncovered area.

B. Groundwater and Subsurface Soils

EPA collected and analyzed groundwater samples from 14 on-site groundwater monitoring wells (see Figure V-2: Monitoring Well Locations) and evaluated historical information available from earlier groundwater studies. Low levels of VOCs and metals (lead, cadmium, and arsenic) were present down gradient from the Site. The detection of these compounds was sporadic and unevenly distributed and the concentrations were all below EPA's drinking water maximum contaminant levels (MCLs). The presence of a plume of hazardous contaminants moving away from the Site is not evident from present and historical data. Since historical information indicates that hazardous wastes have been disposed in the landfill, there are three possible explanations for the analytical results seen to date. The first possible explanation is that there are migrating hazardous constituents which have not yet entered the groundwater. The second possible explanation is that there is contaminated groundwater which has not yet been transported beyond the boundary of the landfill, where the monitoring wells are located. The third possible explanation is that the existing landfill conditions, such as the natural hydrologic and geologic conditions within the landfill, the quantity of hazardous wastes disposed and the existing cover, could be preventing the migration or detection of a groundwater contaminant plume.

Iron, manganese, chloride and specific conductance were detected in the groundwater at slightly elevated levels, above ambient conditions, down gradient from the Site. These compounds are typically found in the groundwater migrating from municipal landfills and do not have a high toxicity.

The investigation indicated that groundwater in the vicinity of L&RR flows to the east and southeast and discharges into tributaries of Trout Brook and wetlands adjacent to the Site. The average rate of groundwater flow was estimated to range from 5 to 10 ft/year in the upper kame delta deposits and from 230 to 460 ft/yr in the lower ice contact deposits.

EPA also reviewed residential well data generated by the Rhode Island Department of Health. Low levels of VOCs were present in some of the residential wells with no consistent trends. In some instances, the types of VOCs detected were different than those detected in the on-site monitoring wells.

Subsurface soil samples were obtained during the drilling of the groundwater monitoring wells. The results of the analyses did not indicate the presence of significant levels of contaminants.

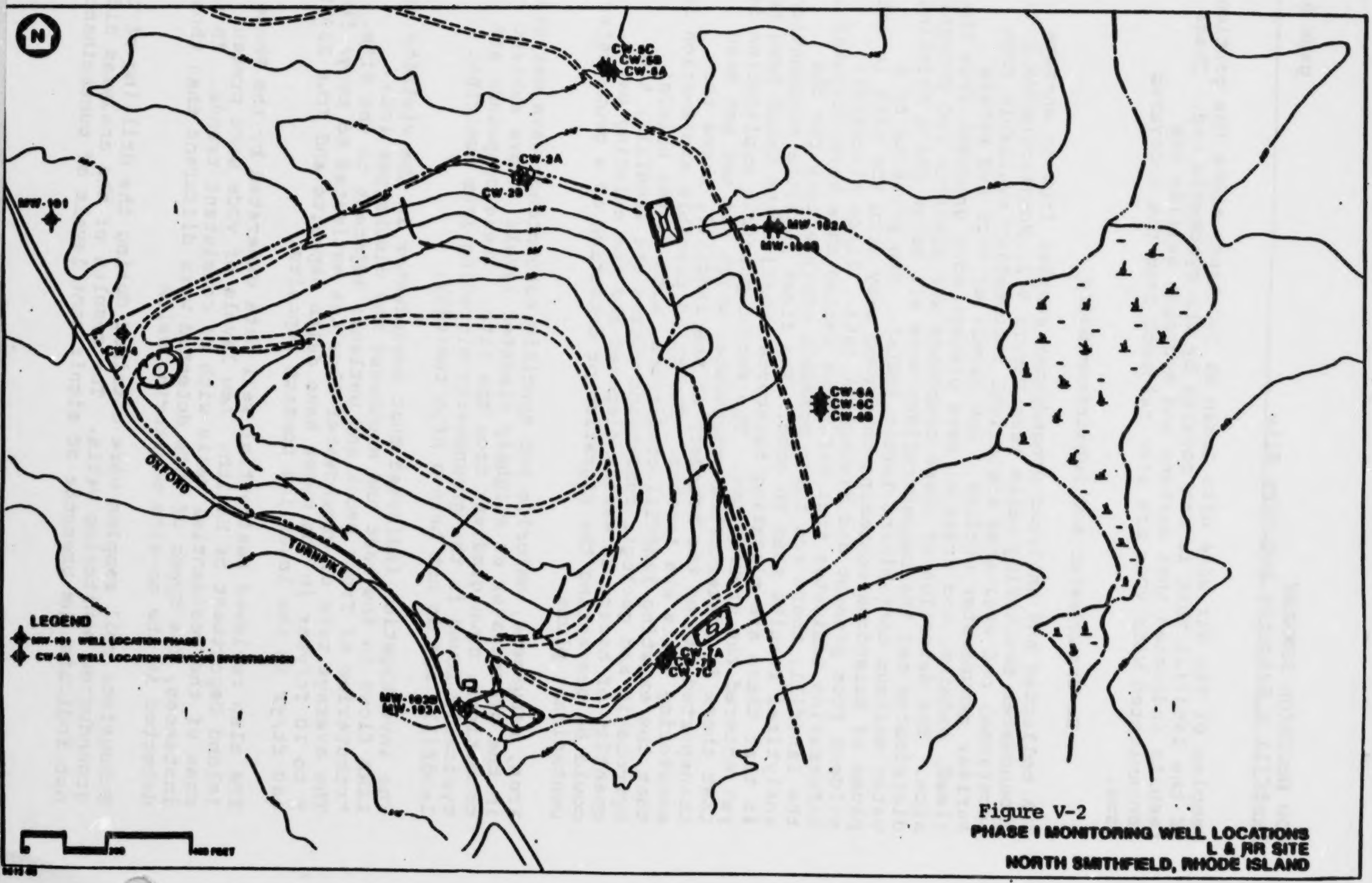

N
CW-5C
CW-5B
CW-5A
CW-3A
CW-3B
MW-101
MW-102A
MW-102B
CW-1
CW-6A
CW-6C
CW-6B
OXFORD
TURNPIKE
CW-7A
CW-7B
CW-7C
MW-103B
MW-103A
LEGEND
MW-101 WELL LOCATION PHASE I
CW-6A WELL LOCATION PREVIOUS INVESTIGATION
0
200
400 FEET

Figure V-2
PHASE I MONITORING WELL LOCATIONS
L & RR SITE
NORTH SMITHFIELD, RHODE ISLAND

In summary, based on all the data generated, EPA concluded that a plume of hazardous contaminants is not yet migrating from the Site. All contaminants are below MCLs. The elevated levels of iron, manganese, chloride and specific conductance are typical of an inorganic plume migrating from a municipal landfill. Finally, the L&RR Site is not presently impacting the local private wells. Contaminants found at those wells are presently attributed to sources other than the L&RR landfill.

C. Surface Water and Sediments

To characterize impacts to local area streams, samples of the surface water and sediments were taken (see Figure V-3: Surface Water and Sediment Locations). As in the case of the groundwater, the surface water and sediments also contain very low levels of VOCs. Slightly elevated levels of inorganic compounds were also detected.

VI. SUMMARY OF SITE RISKS

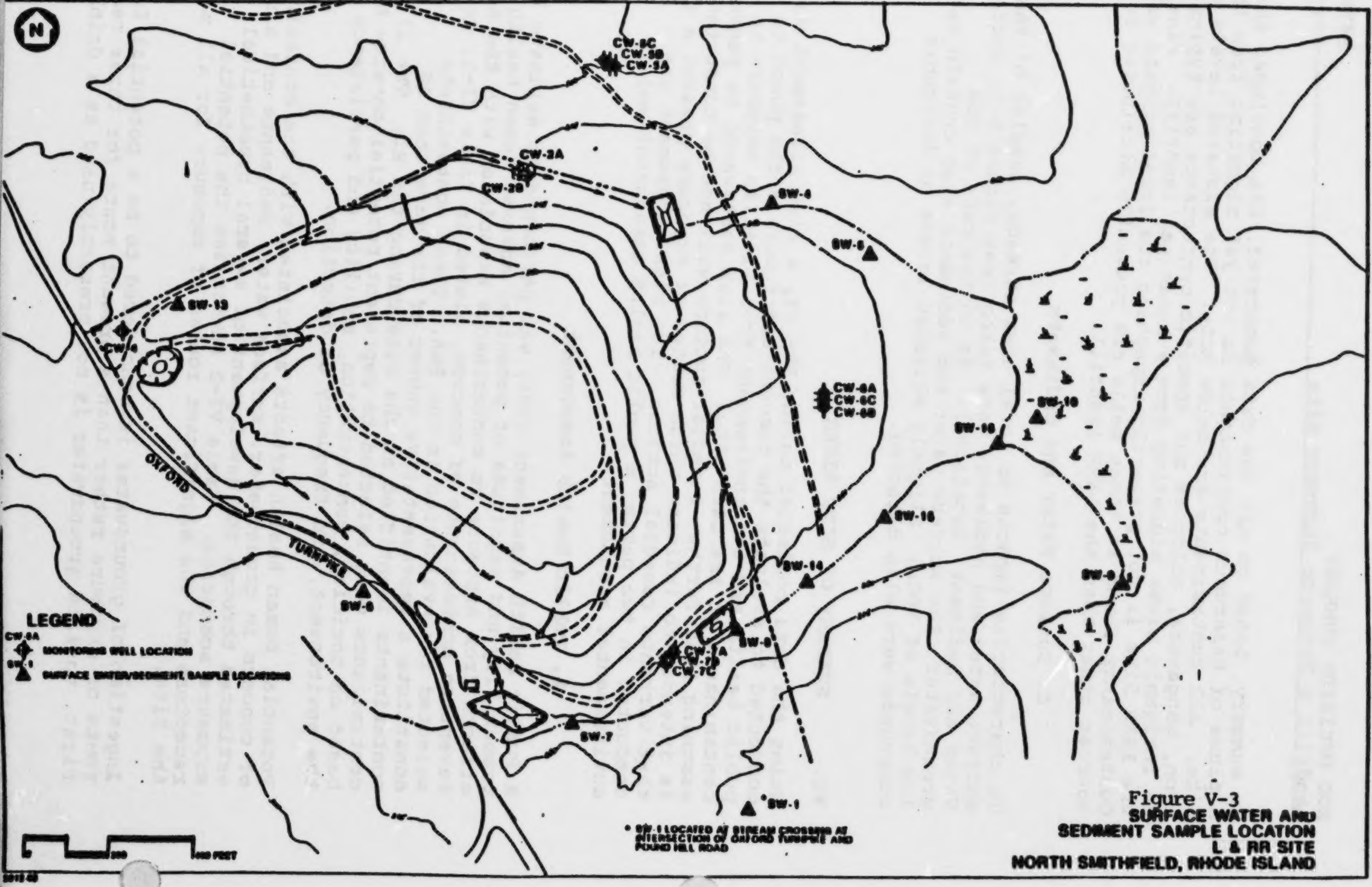
Using the data collected during the RI, a risk assessment was conducted to evaluate the present and future risks posed to public health and the environment from lifetime exposure to contaminants at the L&RR Site. The risk assessment is performed assuming that further remedial actions will not be conducted and is intended to indicate which routes of exposure present a risk that warrants remedial actions. The risk assessment was conducted in two parts: a public health assessment and an environmental assessment.

A. Public Health Assessment

A Public Health Assessment (PHA) was performed to estimate the probability and magnitude of potential adverse human health effects from exposure to contaminants associated with the Site. Seventeen contaminants of concern, listed in Table VI-1, were selected for evaluation in the PHA. These contaminants constitute a representative subset of the more than 30 contaminants identified at the Site during the RI. The 17 contaminants were selected to represent potential on-site hazards based on toxicity, concentration, mobility and persistence in the environment, and frequency of detection.

Potential human health effects associated with the contaminants of concern in groundwater, surface water, sediments and air were estimated through the development of several hypothetical exposure scenarios. Table VI-2 summarizes the potential receptors and the significant routes of exposure for all media at the Site.

Ingestion of groundwater is considered to be a potential future route of exposure rather than a present route for three reasons. First, on-site groundwater is not presently used as a drinking


CW-5C
CW-5B
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SW-5
SW-13
CW-1
CW-6A
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CW-6B
SW-10
SW-16
SW-15
SW-14
SW-9
SW-8
CW-7A
CW-7C
SW-6
SW-7
SW-1
OXFORD
TURNPIKE
LEGEND
CW-6A
MONITORING WELL LOCATION
SW-1
SURFACE WATER/SEDIMENT, SAMPLE LOCATIONS
0
200
400 FEET
* SW-1 LOCATED AT STREAM CROSSING AT INTERSECTION OF OXFORD TURNPIKE AND POUND HILL ROAD
2019-03

Figure V-3
SURFACE WATER AND
SEDIMENT SAMPLE LOCATION
L & RR SITE
NORTH SMITHFIELD, RHODE ISLAND

Table VI-1
Contaminants of Concern

	MEDIA			
COMPOUND	**Groundwater**	**Surface Water**	**Sediment**	**Air**
o VOCs				
2-butanone	X	X	X	
toluene		X		X
trans-1,2-dichloroethene		X		
1,1-dichloroethane		X		
chloroform				X
1,2-dichloroethane				X
carbon tetrachloride				X
benzene				X
1,1,-dichloroethene				X
methylene chloride				X
tetrachloroethene				X
1,1,2,2-tetrachloroethane				X
trichloroethene				X
ethyl benzene				X
o SVOCs				
none selected				
o Pesticides				
none selected				
o Inorganics				
arsenic	X	X		
lead	X	X		
zinc		X		

Table VI-2
Summary of Exposure Routes

Medium	Point of Exposure	Route of Exposure	Exposed Population	Status
Groundwater	Downgradient wells	Ingestion	Adults & children	Future
Surface water	Eastern Edge Southern Edge Western Edge	Dermal absorption	Children	Current
Sediments	Eastern Edge Southern Edge	Dermal absorption	Children	Current
Air Emissions	Vents on landfill and dispersion downwind	Inhalation	Adults & children	Current

water source. Second, based on the information gathered to date, a contaminant plume is presently not migrating from the Site and impacting off-site private wells. Finally, the landfill is located over the Slatersville Aquifer which is classified as a potential future drinking water source, so that there is a threat of future releases from the Site into drinking water.

The streams near the Site are rather shallow and swimming is not considered probable. However, children who might play near the Site could be exposed by wading in such streams. Adults are not expected to use the Site for this purpose and are therefore not considered to be exposed to contaminants in the surface water and sediments.

Gaseous emissions from the landfill vents as well as fugitive emissions from the surface of the landfill are considered to be potential routes of exposure. Presently, the landfill vents are closed and the majority of the gaseous emissions are retained at the Site. However, these vents will eventually have to be opened to protect the integrity of the landfill's synthetic cover from pressure building up within the landfill.. Therefore, inhalation of the vent emissions is a potential future route of exposure.

EPA's exposure scenarios are designed to identify the level of clean-up that would be acceptable without the need for long term management, such as a fence, to prevent on-site exposure. In assessing the risks associated with the landfill emissions, separate exposure scenarios were utilized for children and adults because children could be expected to play at the Site and be exposed to the undiluted emissions from the vents.

The conclusions of the public health assessment are as follows:

- o Of all the potential risks evaluated at the Site, exposure to gaseous emissions from the landfill pose the highest health risk. If the vents were opened and neighboring residents were exposed throughout their lifetime to the gaseous emissions from the vents, a potential risk to public health could result from exposure to these gases. Furthermore, children who might play on the landfill are at the greatest risk.

- o Exposure to groundwater at the boundary of the Site does not presently pose a significant risk to public health. It is important to note that it was determined from the data collected that the L&RR Site is not presently the source of contamination in the residential wells near the Site. EPA has requested that the State of Rhode Island investigate other potential sources of contamination for these wells.

- o Exposure to surface water and sediments adjacent to the Site does not presently pose a significant risk to public health.

A complete discussion of the Public Health Assessment can be found in Section 11 of the RI/FS Report.

B. Environmental Assessment

This part of the risk assessment evaluated risks posed to the wetlands and various wildlife including aquatic organisms at the Site from exposure to pollutants and contaminants. The assessment concluded that the only significant environmental threat is to the wetlands surrounding the Site (see Figure VI-1: Wetland Community Section). The wetlands are being impacted by soil eroding from the landfill cover. The eroded soil is not contaminated; however, it is filling in the wetlands, destroying vegetation and decreasing the ability of the wetland area to support indigenous plant and animal life.

A complete discussion of the Environmental Assessment can be found in Section 10 of the RI/FS Report.

VII. LANDFILL CLOSURE ASSESSMENT

In 1983, L&RR, Inc., entered into a Court Order and Consent Order and Agreement ("the 1983 Court Order") with RIDEM, to close the landfill according to plans incorporated into the Order. EPA commented on these plans but was not a party to this Court Order. The 1983 Court Order, the plans and the data supporting them failed to meet the requirements of the National Contingency Plan (NCP). Negotiations for the conduct of an RI/FS in conformance with the NCP were conducted between EPA and L&RR, Inc., but an agreement was not reached. The owner closed the landfill according to the plans in the 1983 Court Order when landfilling stopped in January of 1985.

During 1985 and 1986, GCA Corporation, under contract to EPA, observed the Site closure operations and evaluated its compliance with the Resource Conservation and Recovery Act (RCRA), Subtitle C, regulations. Section 40 CFR Part 264 of the RCRA regulations contains requirements governing design, construction, operation, maintenance, disposal, closure and post-closure of a hazardous waste facility. Some of these regulations are considered relevant and appropriate requirements for the Site since the L&RR Site contains wastes that are listed in RCRA as hazardous wastes and these wastes were accepted for disposal prior to 1980 (See Tables XII-1,2 and 3). The information obtained by GCA was intended to supplement information obtained during EPA's RI/FS. GCA's observations and findings were documented in the Compliance Oversight Report by GCA, dated June 1986. EPA began the RI/FS in May of 1986. During the RI, EPA evaluated the performance of the landfill closure as it had been conducted to date. The significant finding are summarized below.

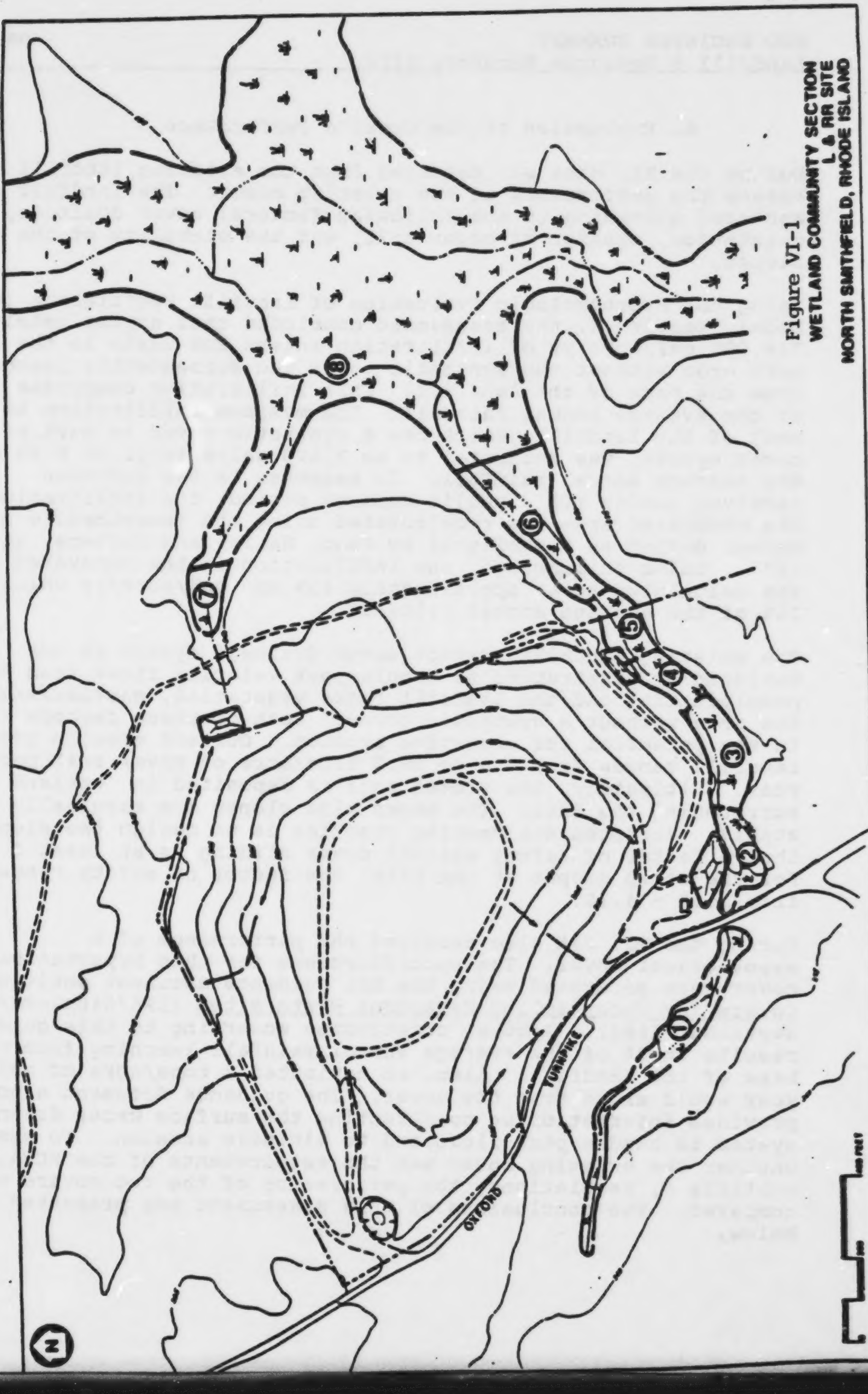

1
2
3
4
5
6
7
8
OXFORD
TURNPIKE
N

Figure VI-1
WETLAND COMMUNITY SECTION
L & RR SITE
NORTH SMITHFIELD, RHODE ISLAND

A. Evaluation of the Cover's Performance

During the RI, data was gathered from the existing landfill to assess the performance of the existing cover. The landfill was assessed according to the following factors: cover drainage, vegetation, erosion of cover soil, and the stability of the side slopes.

Using the Hydrogeologic Evaluation of Landfill Performance (HELP) model, Version I, the assessment concluded that approximately 749,000 gal/acre/yr of infiltration enters the waste in the 4.9 acre area without the synthetic cover and subsequently leaches from the base of the landfill. This infiltration comprises 59% of the average annual rainfall. The maximum infiltration in the rest of the landfill, which has a synthetic cover as part of the cover system, was estimated to be 7,690 gal/acre/yr or 0.6% of the average annual rainfall. In response to the comments received during EPA's public comment period, the infiltration in the uncovered area was recalculated using the Thornthwaite and Mather method as republished by Fenn, Hanley and DeGeare, in 1977. Using this method, the infiltration in the uncovered area was calculated to be approximately 435,000 gal/acre/yr which is 34% of the average annual rainfall.

The existing landfill surface water drainage system is not designed or constructed to handle peak velocity flows from heavy precipitation and the landfill lacks vegetation, particularly in the area without a synthetic cover. Both of these factors result in the potential for excessive erosion. Current erosion from the landfill ranges from 0.5 to 38.3 tons/acre of cover soil per year. Ultimately, the eroded soil is deposited in wetland areas surrounding the Site. The steep side slopes are marginally stable. Accepted engineering practice is to design the slopes so that a factor of safety against cover sliding is at least 1.25. For the steep slopes at the Site, the factor of safety ranged from 1.02 - 1.15.

During the RI, EPA also assessed the performance of a hypothetical cover. The specifications for this hypothetical cover were generated using the EPA guidance document entitled Covers for Uncontrolled Hazardous Waste Sites (EPA/540/2-85/002; September 1985). A cover constructed according to this guidance results in 2% of the average annual rainfall leaching from the base of the landfill. Also, an estimated 2 tons/acre of soil per year would erode from the cover. The guidance document also provides information on constructing the surface water drainage system to handle peak flows and to minimize erosion. To assess whether the existing cover met the requirements of the RCRA, Subtitle C, regulations, the performance of the two covers was compared. The conclusions of this assessment are presented below.

B. Compliance with Federal and State RCRA Requirements.

Some of the RCRA, Subtitle C, regulations are considered relevant and appropriate requirements for the L&RR Site. During the assessment, it was determined that the existing landfill closure does not meet the RCRA regulations as outlined in 40 CFR Subpart N, § 264.310. Specifically, it does not minimize erosion; it does not minimize infiltration of liquids such as rain and melted snow and it does not function with minimum maintenance. Furthermore, the present Site security system does not meet the objectives of 40 CFR Subpart B, § 264.14; the present groundwater monitoring plan does not meet the objectives of 40 CFR Supart F, § 264.90 - § 264.101; and, the post closure plan does not meet the objectives of 40 CFR Subpart G, § 264.110 - § 264.120. The specific deficiencies pertaining to security, the groundwater monitoring plan, and the post closure plan are discussed in detail in the GCA Report and the RI/FS Report, which are included in the Administrative Record.

In addition to the above, the landfill cover does not meet Rhode Island's Rules for Solid Waste Management Facilities (R.I.G.L. 23-18.9). These rules require a total of 24 inches of cover soil to be maintained on the surface of the landfill. Presently, the 2:1 side slopes are only covered with approximately 1 foot of soil. Furthermore, the erosion of the cap into the wetlands violates the State's Wetlands law, (R.I.G.L. 2-1).

A complete discussion of the landfill closure assessment can be found in the GCA Report and Section 9.0 of the RI/FS Report.

VIII. DEVELOPMENT AND SCREENING OF ALTERNATIVES

A. Statutory Requirements/Response Objectives

Prior to the passage of the Superfund Amendments and Reauthorization Act of 1986 (SARA), actions taken in response to releases of hazardous substances were conducted in accordance with CERCLA as enacted in 1980 and the revised National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300, dated November 20, 1985. Until the NCP is revised to reflect SARA, the procedures and standards for responding to releases of hazardous substances, pollutants and contaminants shall be in accordance with Section 121 of CERCLA and to the maximum extent practicable, the current NCP.

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that EPA's remedial action, when complete, must comply with applicable or relevant and appropriate environmental standards established under federal and state environmental laws unless a statutory waiver is granted; a requirement that EPA select a remedial action that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a statutory preference for remedies that permanently and significantly reduce the volume, toxicity or mobility of hazardous substances, pollutants and contaminants over remedies that do not achieve such results through treatment. Response alternatives were developed to be consistent with these Congressional mandates.

Remedial response objectives define the specific aspects of a site that must be considered during remediation. For the L&RR Site, response objectives were formulated for the landfill closure, wetlands and landfill gas based on environmental problems defined in the public health, environmental and landfill closure assessment. These response objectives are used to develop appropriate remedial alternatives and are as follows:

- remediate the landfill so that federal and state applicable, relevant and appropriate requirements are met and to insure that the landfill is protective of human health and the environment;
- reduce present and future impacts to wetlands due to sedimentation of eroded landfill cover material;
- remediate the wetlands already impacted by sedimentation; and
- remediate the landfill gas so that VOC concentrations in ambient air are reduced and risks to public health and the environment are minimized.

B. Technology and Alternative Development and Initial Screening

CERCLA, the NCP, and EPA guidance documents including, "Guidance on Feasibility Studies Under CERCLA" dated June 1985, and the "Interim Guidance on Superfund Selection of Remedy" [EPA Office of Solid Waste and Emergency Response (OSWER)], Directive No. 9355.0-19 (December 24, 1986) set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements and guidance documents, a range of alternatives were developed for the Site. In accordance with Section 121 of CERCLA, this range must include the following categories: a no action alternative, alternatives that utilize containment technologies and treatment alternatives ranging from an alternative that would eliminate the need for long-term management (including monitoring) at the Site to alternatives that utilize treatment to reduce the mobility, toxicity, or volume of the hazardous substances as their principal element.

Section 121(b)(1) of CERCLA presents several factors that at a minimum EPA is required to consider in its assessment of alternatives. In addition to these factors and the other statutory directives of Section 121, the evaluation and selection process was guided by the EPA document "Additional Interim Guidance for FY '87 Records of Decision" dated July 24, 1987. This document provides direction on the consideration of SARA cleanup standards and sets forth nine factors that EPA should consider in its evaluation and selection of remedial actions. The nine factors are:

1. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs).
2. Long-term Effectiveness and Permanence.
3. Reduction of Toxicity, Mobility or Volume.
4. ~~Short-term~~ Effectiveness.
5. Implementability.
6. Community Acceptance.
7. State Acceptance.
8. Cost.
9. Overall Protection of Human Health and the Environment.

Section 15 of the RI/FS Report identified, assessed and screened technologies based on Site and waste characteristics such as geology and hydrology; availability of space and resources; the presence of special Site features; the contaminated media; and, the type and concentrations of wastes. These technologies were combined into remedial alternatives that would provide a comprehensive remedial approach to the Site. At the conclusion of this process, 6 remedial alternatives were developed for the Site: a no action alternative (Alternative 1), four containment alternatives (Alternatives 2-5) and a treatment alternative (Alternative 6). These alternatives are presented in Table VIII-1.

Alternatives 3, 4 and 5 contain a landfill gas treatment component. Three thermal destruction technologies were identified for treating the landfill gas: combustion, flaring and incineration. During the FS, it was determined that any one of these technologies could be included with any one of the alternatives.

Table VIII-1
Alternatives Developed for
LANDFILL AND RESOURCE RECOVERY

Alternative	Description of Key Components
Alternative 1: No-action	- Groundwater monitoring for indicators of contaminant migration.
Alternative 2: Vegetation Establishment	- Groundwater monitoring for indicators of contaminant migration. - Post-closure plan development to monitor, maintain, and inspect site. - Surface water management to minimize erosion of final cover and minimize maintenance requirements. - Vegetation establishment to minimize erosion of final cover. - Vegetation establishment on 2:1 side slope to minimize erosion and enhance evapotranspiration. - Cover thickness establishment (a minimum of 24 inches to meet ARARs). - Minimal gas control to enhance vegetation and, therefore, minimize erosion and maintenance. - Sediment removal in wetland and on-site disposal. - Fence installation to limit site access.
Alternative 3: Synthetic Cover Installation/Slope Stabilization	- Groundwater monitoring for indicators of contaminant migration. - Post-closure plan development to monitor, maintain, and inspect site. - Surface water management to minimize erosion of final cover and minimize maintenance requirements. - Vegetation establishment to minimize erosion of final cover. - Cover thickness establishment (a minimum of 24 inches to meet ARARs). - Slope stabilization by flattening 2:1 side slope to 2.5:1 and constructing terrace along new slope. - Synthetic cover installation on terraced 2.5:1 side slope to minimize maintenance and the migration of fluids through the landfill. - Landfill gas treatment. - Sediment removal in wetlands and on-site disposal. - Fence installation to limit site access.

Table VIII-1
Alternatives Developed for
LANDFILL AND RESOURCE RECOVERY
Continued

Alternative	Description of Key Components
Alternative 4: Slope Flattening/ Synthetic Cover Installation	- Groundwater monitoring for indicators of contaminant migration. - Post-closure plan development to monitor, maintain, and inspect site. - Surface water management to minimize erosion of final cover and minimize maintenance requirements. - Vegetation establishment to minimize erosion of the final cover. - Cover thickness establishment (a minimum of 24-inches to meet ARARs). - Flatten 2:1 side slope to 3:1 in unlined area to minimize erosion and maintenance. - Synthetic cover installation on 2:1 side slope. - Landfill gas treatment. - Sediment removal in wetlands and on-site disposal. - Fence installation to limit site access.
Alternative 5: RCRA Guidance Cover Installation	- Groundwater monitoring for indicators of contaminant migration. - Post-closure plan development to monitor, maintain, and inspect site. - Surface water management to minimize erosion of final cover and minimize maintenance requirements. - Construction of a RCRA guidance cover over the existing cover: o flatten 2:1 side slope to 3:1 o synthetic cover installation for 2:1 side slope area o clay cover installation over entire site o vegetation establishment including a drainage layer - Landfill gas treatment. - Sediment removal in wetlands and on-site disposal. - Fence installation to limit site access.
Alternative 6: Excavation and Treatment	- Excavation of landfill wastes to prevent contaminant migration. - Incineration of removed wastes prior to placement in RCRA-compliant facility. - Sediment removal and on-site disposal.

In Section 16 of the RI/FS Report, the alternatives were screened according to effectiveness, implementation and cost. The purpose of this screening was to narrow the number of potential remedial alternatives for further detailed analysis while preserving a range of alternatives for the Site. As a result of this screening process, Alternative 6, which utilized treatment (excavation and incineration) as a primary component and eliminated the need for long-term Site monitoring, was eliminated as a potential remedy because public health and environmental risks would be posed by its implementation. A detailed discussion of the reasons for elimination are presented in Appendix AA of the RI/FS Report, and in Section XII.D. of this document.

IX. DESCRIPTION/SUMMARY OF THE DETAILED AND COMPARATIVE ANALYSIS OF ALTERNATIVES

After the screening process, a detailed analysis was conducted on the five remaining alternatives. A detailed analysis was also conducted on each of the gas treatment technologies. Based on the conclusions of the analysis, the selected remedy would include one of the alternatives and one of the gas treatment technologies. This section presents a narrative summary and brief evaluation of each alternative and each technology according to the evaluation criteria described above.

A. Alternatives Analyzed

The five alternatives that were analyzed in detail for the Site include a no action alternative (Alternative 1) and four containment alternatives (Alternatives 2-5).

Alternative 1 — **Approximate Present Worth Cost: $ 850,000.**
No Action

The no action alternative would not require further remediation to the landfill closure conducted to date according to the 1983 Court Order between L&RR, Inc., and RIDEM but would consist solely of long-term groundwater monitoring. Each existing well would be sampled on a quarterly basis and analyzed for specific parameters identified in Table 18-1 of the RI/FS Report. Because this alternative results in wastes remaining on-site, the Site would be reviewed on a periodic basis.

This alternative would not be protective to public health and the environment because it does not reduce the existing risks associated with exposure to landfill gas emissions; it does not reduce impacts to the surrounding wetlands; it would not reduce the potential for off-site releases into groundwater resulting from infiltration; and, it would not comply with ARARs, specifically the RCRA regulations outlined in Section VII of this document.

A detailed assessment of this alternative can be found in Section 18 of the RI/FS Report.

Alternative 2
Vegetation Establishment
Approximate Present Worth Cost: $3,970,000.

This alternative consists of the following components:

- removing sediments and reseeding the wetlands;
- installing a chain linked fence;
- developing a post closure plan;
- upgrading the present surface water runoff management system;
- establishing a cover thickness of 24 inches;
- establishing vegetation; and,
- installing a passive gas collection system.

This alternative includes components that would upgrade the landfill closure conducted to date according to the 1983 Court Order. Establishing vegetation and upgrading the surface water runoff management system would minimize erosion and maintenance. The wetlands surrounding the Site would be restored and future impacts would be mitigated.

As discussed in Section VII of this document, EPA's RCRA regulations, 40 CFR 264 are relevant and appropriate for this Site. The RCRA landfill closure requirements in 40 CFR § 264.310 would not be satisfied by this remedy, because it would not provide long-term minimization of migration of liquids through the landfill (§ 264.310(a)(1)), in the area that is not capped by a synthetic cover. The excess infiltration increases the potential for groundwater contamination. Although an organic plume has not yet been detected, it is expected that one may emerge in the future. Therefore, the long-term protectiveness of this alternative is questionable. This alternative is readily implementable, taking approximately 2-3 months to design and construct, and would require long-term monitoring and maintenance.

This alternative does not contain gas treatment because it is difficult to implement a treatment system with this alternative. The landfill gas would be diluted with uncontrolled amounts of air that would be drawn in from the area which does not have a synthetic cover. The air would lessen the combustibility of the landfill gas. Therefore, this alternative includes a passive gas collection system. This system would direct the landfill gas away from the uncovered area of the landfill to minimize the destruction of vegetation in this area. The existing landfill vents would be opened to prevent the build up of gases under the liner. Since this system does not involve treatment, the toxicity of the gas would not be reduced and the potential risks to public health would remain. Therefore, EPA does not consider this alternative protective of public health. In addition, this

alternative does not satisfy the statutory preference for treatment, which is satisfied by other alternatives providing gas treatment.

A detailed assessment of this alternative can be found in Sections 19 and 20 of the RI/FS Report.

Alternative 3 **Approximate Present Worth Cost:**
Synthetic Cover Installation/ **** $ 5,062,000.**
Slope Stabilization

This alternative consists of the following components:

- **removing sediments and reseeding the wetlands;**
- **installing a chain linked fence;**
- **developing a post closure plan;**
- **upgrading the present surface water runoff management system;**
- **establishing a cover thickness of 24 inches;**
- **establishing vegetation;**
- **installing a synthetic cover on the uncovered area;**
- **stabilizing the 2:1 side slopes by slightly extending the slope and installing a terrace; and**
- **gas collection and treatment;**

This alternative contains most of the components in Alternative 2 except this alternative includes installing a synthetic cover on the uncovered area of the landfill and stabilizing the 2:1 side slope. Installing the synthetic cover will minimize infiltration. Stabilizing the side slopes will minimize erosion and maintenance as well as protect the integrity of the synthetic cover. Therefore, this alternative complies with RCRA regulations. Also, since infiltration is minimized and the 2:1 slopes are stabilized, this alternative provides improved long term protectiveness by minimizing the potential for groundwater contamination. In this alternative, the slopes would be stabilized by extending the slope slightly and constructing a terrace. Approximately 1 acre of land adjacent to the landfill would have to be acquired to implement this alternative.

Due to the steepness of the side slopes, this alternative will be relatively difficult to implement, taking approximately 9 to 11 months to design and construct. The stability of the slopes will have to be tested during the design phase.

This alternative contains a gas collection and treatment process that would reduce the toxicity of the gas and reduce the risks to public health from exposure to the landfill gas. A discussion of this system is presented in the next section of this document, Section X.B.

Because this alternative would be protective of public health and the environment, and would comply with ARARs, it has been

tentatively selected as the selected remedy, pending a determination of its implementability (see Sections XI of this document).

A detailed assessment of this alternative can be found in Sections 19 and 21 of the RI/FS Report.

** Cost does not include the cost of gas collection and treatment.

Alternative 4
Synthetic Cover Installation/
Slope Flattening

Approximate Present Worth Cost:
**** $ 5,490,000.**

This alternative contains all of the components in Alternative 3 except this alternative utilizes a different technique to stabilize the steep side slopes. In this alternative, the slopes would be extended and flattened until a slope of 3:1 is achieved. This slope is less steep and is recommended in EPA's guidance for constructing covers that comply with RCRA regulations. This alternative would provide the same level of protection as Alternative 3 but would be easier to implement because of the reduction in the steepness of the slopes. Present estimates show this alternative to be slightly more expensive than Alternative 3. Approximately 3 acres of land would have to be acquired to implement this alternative and it would also take about 11 months to design and construct.

Because this alternative would also be protective of public health and comply with ARARs, this alternative has been retained as an alternate selected remedy (see Section XI of this document).

A detailed assessment of this alternative can be found in Sections 19 and 22 of the RI/FS Report.

** Cost does not include the cost of gas collection and treatment.

Alternative 5
RCRA Guidance Cover

Approximate Present Worth Cost:
**** $ 11,670,000.**

This alternative consists of the following components:

- removing sediments and reseeding the wetlands;
- installing a chain linked fence;
- developing a post closure plan;
- upgrading the present surface water runoff management system;
- constructing a cover according to EPA's RCRA guidance which would include flattening the 2:1 side slope, installing a synthetic cover on the flattened slope, placing a clay barrier over entire Site, and establishing vegetation (including placement of a drainage layer); and
- gas collection and treatment.

This alternative is similar to Alternatives 3 and 4 except that it complies with both the RCRA regulations and the specifications in EPA's guidance document discussed in Section VII. The RCRA closure guidance is not an ARAR but is to be considered. Alternatives 3 and 4 would not include all the elements called for in the guidance, but they would meet the RCRA closure performance standards. This alternative provides the same level of protection as the previous two alternatives but is twice the cost. EPA has determined that this alternative is not the most cost effective alternative. Due to the additional requirements, it would take approximately 3 years to design and construct this alternative.

A detailed assessment of this alternative can be found in Sections 19 and 23 of the RI/FS Report.

** Cost does not include the cost of gas collection and treatment.

B. Gas Treatment Technologies Analyzed

Three thermal destruction technologies underwent detailed analysis for the L&RR Site: combustion, flaring and incineration. Thermal destruction consists of burning the landfill gas to destroy the hazardous constituents. Typically, these technologies can destroy between 90% and 99.99% of the gas that enters the system. With the concentration of hazardous constituents from the RI and this removal efficiency, these technologies will be protective of human health and the environment and achieve ARARs. However, each of the technologies has advantages and disadvantages with regards to factors such as implementability and cost which can not be adequately assessed without Site specific pilot tests. A brief discussion of each technology is given below.

A detailed assessment of each technology can be found in Section 24 of the RI/FS Report.

Technology 1 — **Approximate Present Worth Cost: $1,300,000.**
Combustion

The combustion process is a process that burns the landfill gas and also generates electricity as a useful by-product. Therefore, this technology is a resource recovery technology. Several combustion systems have been installed at municipal landfills and have been demonstrated for burning conventional municipal landfill gas, typically achieving 90% destruction. However, little information is available on the effectiveness of burning hazardous constituents. Also, due to the acidic compounds present in the gas, corrosion of the equipment may occur and increase maintenance costs.

Technology 2 **Approximate Present Worth Cost:**
Flaring **$612,000.**

The flaring process is similar to combustion except that it does not contain a generator and therefore will not produce electricity. Flaring has been demonstrated to be effective in removing hazardous constituents in miscellaneous gas streams. Ninety percent (90%) removal efficiencies have been demonstrated. However, corrosion could increase maintenance costs.

Technology 3 **Approximate Present Worth Cost:**
Incineration **$1,277,000.**

Incineration is a two step process which routinely achieves 99 to 99.99% destruction. Incinerators have been demonstrated for burning both municipal landfill gas and gas streams containing hazardous wastes. The technology is readily implementable.

X. DOCUMENTATION OF SIGNIFICANT CHANGES

There are no significant changes from EPA's Proposed Plan in EPA's selected remedy.

XI. THE SELECTED REMEDY

A. Description of the Selected Remedy

The selected remedy has four major components which together form a comprehensive approach to Site remediation. The first two components, upgrading the landfill closure completed to date and treating the landfill gas, are intended to control the source and minimize the potential of hazardous substances migrating from the Site. Remediation of the impacted wetlands is the third major component which will occur after the landfill has been upgraded. The fourth component, Site monitoring, will insure that the landfill and the gas treatment components remain effective.

1. Upgrading the Landfill Closure

The existing landfill closure will be upgraded to meet ARARs and to insure that it effectively contains the hazardous wastes. Two alternatives were selected from the alternatives developed in the FS: Alternative 3: Synthetic Cover Installation/Slope Stabilization and Alternative 4: Synthetic Cover Installation/Slope Flattening. These two alternatives are equally protective. Alternative 3 is estimated to be slightly less expensive. However, due to the steepness of the side slopes, this alternative may be relatively difficult to implement, causing the costs to increase. Also, the stability of the side slopes must be evaluated during the design phase. Due to the question concerning implementability, Alternative 4 has also been chosen as a possible alternative. The choice between the two alternatives will be specified during the design phase. The components of these alternatives are described below.

Fence Installation: Site security will meet the requirements of 40 CFR § 264.14. To limit Site access and maintain Site security, a chain-linked fence with barbed wire will be constructed around the facility. Along this fence, two access-road gates (at the facility's north and south entrances from the Oxford Turnpike) and two walkway gates (on the northern and southeastern sides of the Site) will be installed. The walkway gates provide convenient access to off-site monitoring wells. The gates will be kept locked and the fence will be posted with warning signs.

Post-closure Plan Development: Closed hazardous waste disposal facilities must be inspected, monitored, and maintained to prevent adverse effects to human health and the environment in accordance with 40 CFR Part 264.110-264.120; 264.300-264.339 and 264.340-264.599. The post-closure plan will specify how these goals will be achieved at L&RR and must be approved by both EPA and the State. The L&RR post-closure plan will contain plans for monitoring groundwater and landfill gas. In addition, the post-closure plan will describe planned operations, or maintenance and inspection activities, and the frequencies of those activities. At L&RR, these activities will include the following:

- inspection and maintenance of gas and groundwater monitoring equipment;
- periodic mowing;
- inspection and maintenance of the cap's integrity;
- inspection and maintenance of the gas collection and treatment system
- inspection and maintenance of surface water management system
- inspection and maintenance of the security fence; and
- protection and maintenance of surveyed benchmarks.

The L&RR post-closure plan will include a schedule of activities planned during the post-closure period. The post-closure period begins upon certification by an independent registered professional engineer that closure has been completed in accordance with the plan. Post-closure care must last for 30 years unless the post-closure plan is amended.

Surface Water Management System: To limit the potential for further environmental impact due to erosion and to minimize cover maintenance, the present surface water management system will be upgraded and expanded. First, a stone-lined perimeter drainage channel will be added to transport high-volume storm flows (i.e., 24 hour, 25-year storm event) to the sedimentation basins. The perimeter channel will collect most of the surface water. At the southwestern side of the Site, surface water will discharge to the existing roadside ditch along Oxford Turnpike. Second, surface water diversions will be more closely spaced, approximately 200 feet apart on vertical 3:1 slopes. Finally, if the slope is extended, the existing sedimentation pond (P-3) on the northeastern section of the Site will be relocated.

Cover Thickness Establishment: Cover soil consisting of an 18 inch sand layer and a 6 inch topsoil layer capable of supporting vegetation will be added to areas which presently do not have a cover thickness of 24 inches.

Vegetation Establishment: Although vegetation is present on the landfill, it is stressed in some areas. To enhance vegetation, stabilized municipal waste water treatment plant sludge will be incorporated into the top soil. The sludge will be mixed into the soil using a rototiller or disc harrow and the area will be hydroseeded using a sprayed liquid mixture of seed (i.e., grass/legume) and fertilizer. During establishment of the vegetative cover, erosion will be controlled by applying either hay mulch following seeding or a chemical (asphalt) binder during seeding. Prior to use, the sludge will be analyzed to determine whether it meets applicable requirements.

Synthetic Cover Installation/Slope Stabilization: The difference between Alternatives 3 and 4 is the method of stabilizing the 2:1 side slope and the type of synthetic cover utilized. In Alternative 3, the 2:1 slope will be stabilized by extending the slope slightly to a slope of 2.5:1 and constructing a terrace midway down the slope (see Figure XI-1: Comparison of Slope Stabilization Techniques). Approximately 1 acre of land will have to be acquired to construct this alternative. The unlined area encompasses approximately 5 acres. A synthetic membrane will be installed in this uncovered area (see Figure XI-2: Alternative 3). To minimize the potential for slipping, a 20-mil HDPE membrane with surface texture will be installed. In Alternative 4, the 2:1 slope will be extended to a slope of 3:1. Approximately 3 acres of land will be acquired. Since the potential for slipping is much less on a 3:1 slope, a 20-mil PVC geomembrane will be used in this alternative (see Figure XI-3: Alternative 4). Cover soil as described in the section above would then be added on top of the synthetic membrane.

2. Gas Collection and Thermal Destruction

Eighteen gas vents have been installed across the top of the landfill. Each vent is made of 6-inch, slotted PVC pipe, and set 60 to 80 feet into the waste. These vents will be manifolded by a subsurface horizontal pipe system. Using this system the collected gas will be directed to the treatment system located near the southern portion of the Site.

Figure XI-1

Conceptual Comparison of Slope Stabilization Techniques

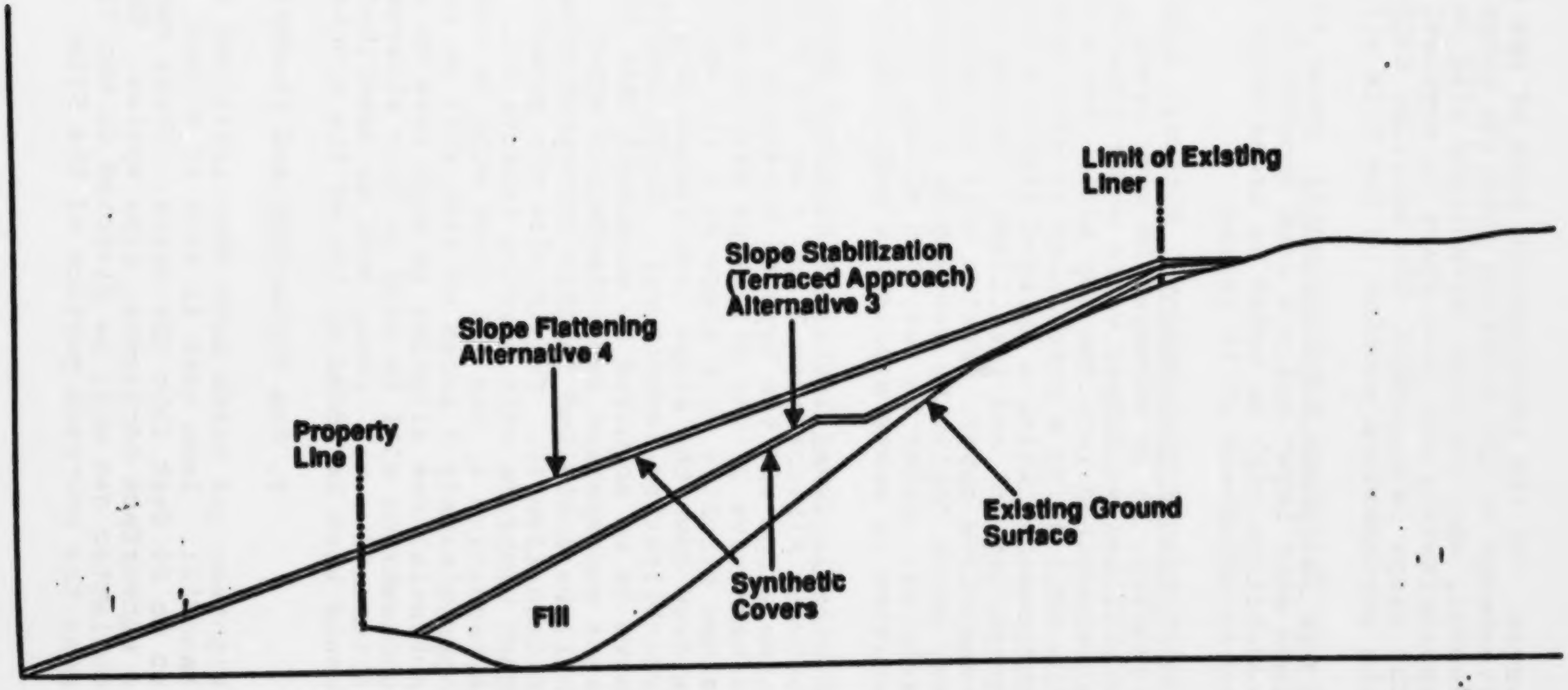

Limit of Existing Liner
Slope Stabilization (Terraced Approach) Alternative 3
Slope Flattening Alternative 4
Property Line
Existing Ground Surface
Synthetic Covers
Fill

Figure XI-2
Landfill & Resource Recovery Site
Alternative 3: Synthetic Cover/Slope Stabilization

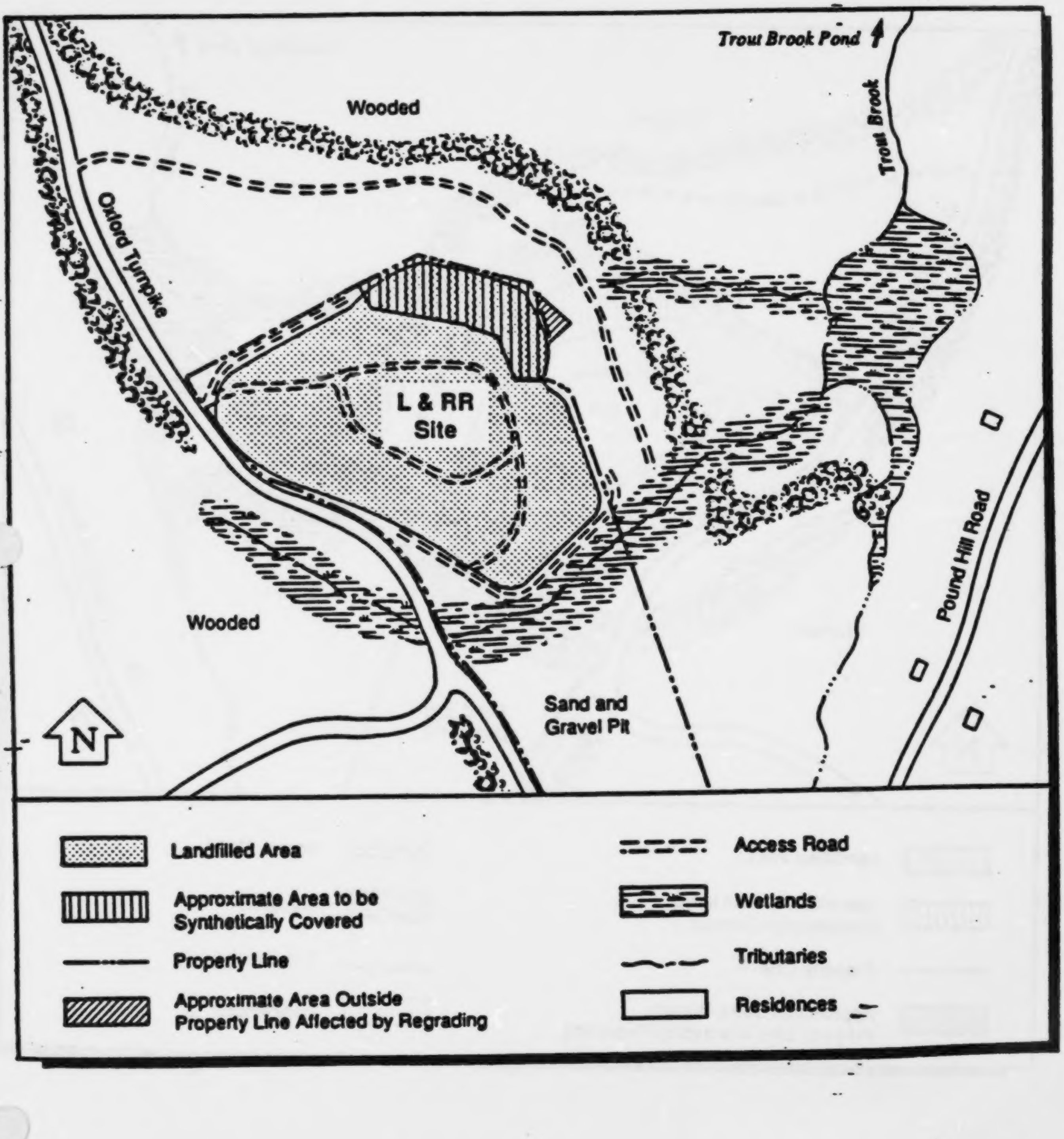
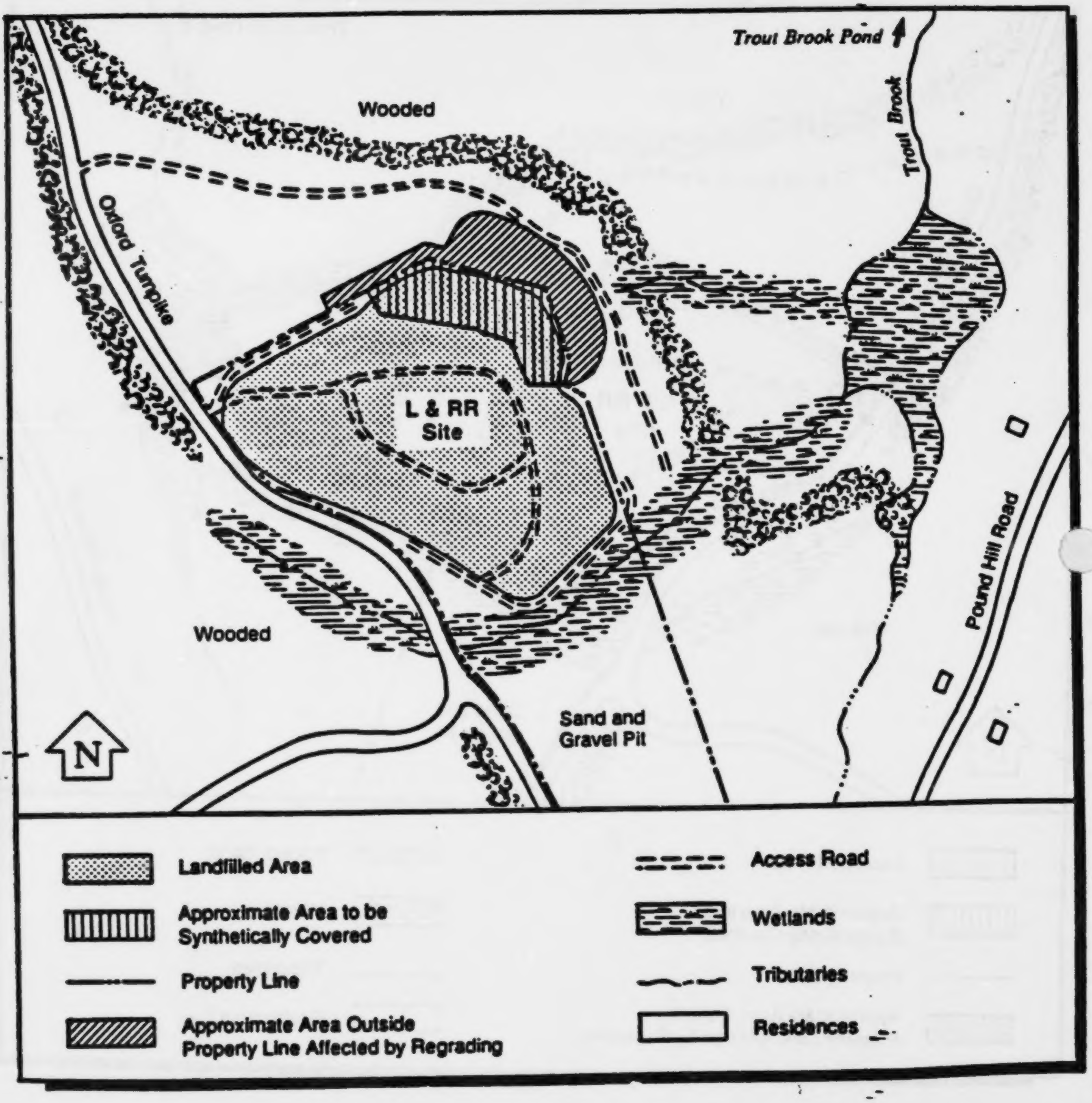

Trout Brook Pond
Wooded
Trout Brook
Oxford Turnpike
L & RR Site
Pound Hill Road
Wooded
Sand and Gravel Pit
N
Landfilled Area
Approximate Area to be Synthetically Covered
Property Line
Approximate Area Outside Property Line Affected by Regrading
Access Road
Wetlands
Tributaries
Residences

Figure XI-3

Landfill & Resource Recovery Site
Alternatives 4: Synthetic Cover/Slope Flattening


Trout Brook Pond
Wooded
Trout Brook
Oxford Turnpike
L & RR Site
Pound Hill Road
Wooded
Sand and Gravel Pit
N
Landfilled Area
Approximate Area to be Synthetically Covered
Property Line
Approximate Area Outside Property Line Affected by Regrading
Access Road
Wetlands
Tributaries
Residences

Three thermal destruction technologies have been selected to treat the gas: combustion, flaring and incineration. As discussed above, these technologies will be protective of human health and the environment and achieve ARARs. However, each of the technologies has advantages and disadvantages in regards to factors like implementability and cost which can not be adequately assessed without Site specific pilot tests. Therefore, the specific technology to be utilized for thermal destruction will be chosen by EPA during the design phase when specific information regarding the performance of each is available. A brief description of each technology is given below.

Combustion: Because the landfill gas contains approximately 50% methane, it can be used to generate electricity. Combustion is a four step process that burns the landfill gas and utilizes the energy created from burning the gas to generate electricity. The process is as follows: (1) condensation/acid scrubbing to remove moisture and organic acids; (2) burning the landfill gas in an internal combustion engine; (3) electricity production using generators for resource recovery; and, (4) discharge of combustion products to atmosphere.

Since organic acids tend to bind to water molecules, the moisture present in the landfill gas will be used to remove the acids present in the gas by passing the gas through a condenser. This acid waste stream is a RCRA hazardous waste that will be handled in compliance with the RCRA regulations. To obtain a proper burning mixture, some air must be added to the gas. Auxiliary fuel will be used to bring the engine to the proper operating temperature. After start up, the methane in the landfill gas will be used to fuel the engine. The electricity generated could be transmitted to area transmissions lines for use.

Flaring: The flaring system is similar to combustion except it does not contain a generator to convert the energy created into electricity. The steps are as follows: (1) condensation/acid scrubbing to remove moisture and organic acids; (2) flaring to thermally degrade VOCs, hydrogen sulfide and methane; and, (3) discharge of combustion products to atmosphere. A single enclosed flare unit, 6 feet in diameter and 24 feet high, could be used for a gas generation rate of 775 cfm.

Incineration: Incineration is a two step process as follows: (1) incineration to oxidize hydrogen sulfide, VOCs and methane; and, (2) discharge of combustion products to the atmosphere.

Unlike combustion and flaring, the incineration process is conducted in a closed reaction chamber which operates at a much higher temperature. This chamber also allows greater control over reaction time of the gas. Because of these two factors, incineration has the potential to achieve greater removal efficiencies than combustion and flaring. Furthermore, this system destroys the organic acids and eliminates the RCRA waste stream.

3. Wetlands Remediation

During the RI, two areas of the wetlands were identified as needing remediation due to cover material erosion and subsequent sedimentation, Sections 1 and 3 (see Figure XI-4: Wetlands Remediation). Additional areas may be defined during the design phase if erosion has caused further damage since the RI was conducted. In these areas, the sand which has eroded from the landfill will be excavated and the wetlands will be revegetated. Approximately 2 to 3 feet of sediment from Section 3 and the southern portion of Section 1 will be excavated. Since the eroded sand is not contaminated, the excavated sediment can be redeposited on-site. To promote wetland revegetation, soils similar to those of the natural wetland will be placed, and sedges and others species will be planted. During revegetation, the natural contour of the wetland will be restored to maintain the easterly flow of the creek toward the main wetland body.

4. Site Monitoring

To insure that the remedy remains protective, both the groundwater and the air will be monitored periodically.

Groundwater Monitoring: The following monitoring wells will compose the groundwater monitoring program.

Wells:	MW-101	CW-5 A,B,C	(15 wells)
	MW-102 A,B	CW-6 A,B,C	
	MW-103 A,B	CW-7 A,C	
	MW-104 A,B		

All wells except MW-104 A&B presently exist on-site. MW-104 A&B will be located approximately between well clusters CW-6 and CW-7, near the stream. Well 104A will be located in the ice contact deposits and well 104B in the kame delta deposits.

The above wells will be monitored quarterly for the following parameters: hazardous substance list(HSL) volatile organic compounds (VOCs), pH, temperature, specific conductance, chloride, arsenic, cadmium, iron, manganese and lead. On an annual basis, the following additional constituents will be analyzed for: barium, chromium, fluoride, mercury, nitrate, selenium and silver.

Quarterly monitoring results will be compared to drinking water maximum contaminant levels (MCLs). If an MCL is exceeded at a given well, that well will be resampled and analyzed. Sampling results will be reviewed on a periodic basis to determine if a variation indicative of a plume is present. In addition, the monitoring program will be reviewed after a minimum of five years of monitoring is completed and may be modified.

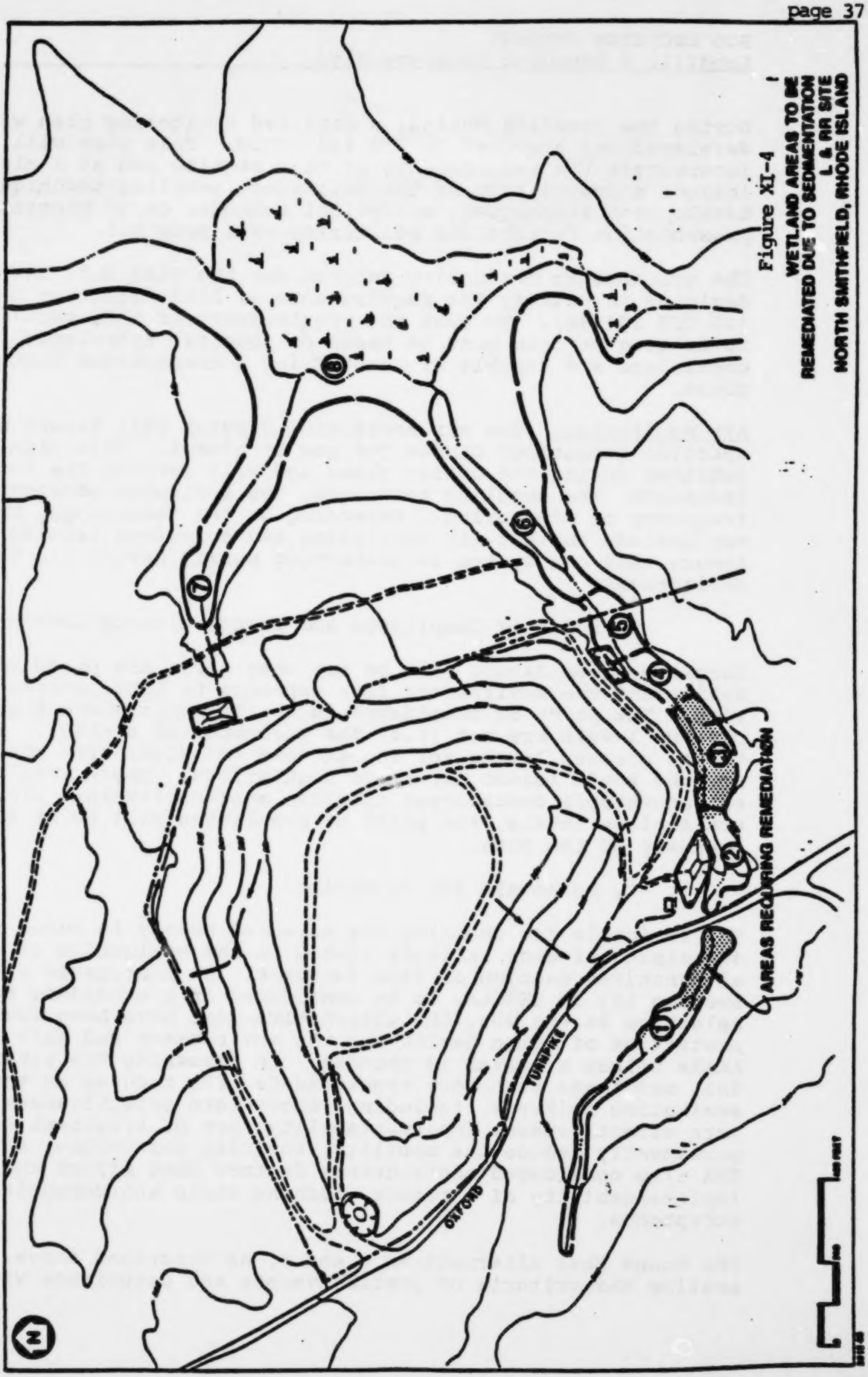

AREAS REQUIRING REMEDIATION
OXFORD
TURNPIKE
1
2
3
4
5
6
7
8
0
200
400 FEET

Figure XI-4

WETLAND AREAS TO BE REMEDIATED DUE TO SEDIMENTATION
L & RR SITE
NORTH SMITHFIELD, RHODE ISLAND

During the remedial design, a detailed monitoring plan will be developed and approved by EPA and RIDEM. This plan will incorporate the requirements of this section and at a minimum include a description of the following: sampling techniques, development techniques, analytical methods, QA/QC program, data presentation formats and monitoring well proposal.

The groundwater monitoring program for the L&RR Site has been designed to satisfy the requirements of RCRA detection monitoring (40 CFR 264.98). To meet the requirements of this section, a monitoring program must be based on specific hydrologic conditions and capable of identifying a groundwater contaminant plume.

Air Monitoring: The air monitoring program will depend on the specific technology chosen for gas treatment. This plan will be outlined during the design phase and will specify the monitoring locations, the sampling technique, the indicator parameters and frequency of monitoring. Depending on the technology, this plan may include ambient air monitoring and emissions testing to insure that the system is protecting public health and the environment.

B. Point of Compliance and Target Cleanup Levels

Target cleanup levels must be set when risks are posed to public health and the environment from exposure to contaminants at a site. The point of compliance is the location where the target cleanup levels are met (i.e. the perimeter of a site). The target cleanup levels for the gaseous emissions from the landfill are the Rhode Island Air Toxic Regulations. These regulations set acceptable contaminant specific ambient levels. Since these are ambient levels, the point of compliance will be at the boundary of the Site.

C. Rationale for Selection

The rationale for choosing the selected remedy is based on the assessment of each criteria listed in the evaluation of alternatives section of this document. In accordance with Section 121 of CERCLA, to be considered as a candidate for selection in the ROD, the alternative must have been found to be protective of human health and the environment and able to attain ARARs unless a waiver is granted. In assessing the alternatives that met these statutory requirements, EPA focused on the other evaluation criteria, including, short term effectiveness, long term effectiveness, implementability, use of treatment to permanently reduce the mobility, toxicity and volume, and cost. EPA also considered nontechnical factors that affect the implementability of a remedy, such as state and community acceptance.

EPA found that Alternatives 3 and 4, as described above, while meeting the criteria of protectiveness and compliance with ARARs, are more cost effective than Alternative 5. A permanent remedy was considered but not selected for reasons described in Section XII.D. below. Alternatives 1 and 2 were rejected as not being protective of public health and the environment.

A number of Site specific factors also impacted EPA's decision for the Site. First, the landfill was presently closed with a synthetic cover over most of the landfill. Second, although a contaminant plume was presently not evident in the groundwater, given the disposal history it is expected that a plume may migrate from the Site in the future. Therefore, the landfill should be closed in a manner that provides the maximum protection possible. The selected remedy will minimize infiltration from the presently uncovered area in order to prevent off-site migration. Third, there is evidence of air impacts from the landfill vents. The selected remedy will include treatment to reduce these impacts. And finally, the remedy will end the erosion into the wetlands from the landfill and remediate present impacts. Based upon these factors and the assessment outlined above, which takes into account the statutory preferences of CERCLA, EPA selected the remedial approach for the Site.

XII. STATUTORY DETERMINATIONS

The remedial action selected for implementation at the L&RR Site is consistent with CERCLA and, to the extent practicable, the NCP.

A. The Selected Remedy is Protective of Human Health and the Environment

The remedy at this Site will permanently reduce the risks presently posed to human health and the environment from exposure to gaseous emissions from the landfill; from sand eroding off the landfill and into the wetlands; and, from infiltration of rain and melted snow through the landfill and into the groundwater.

The potential risks to public health from exposure to the landfill gas will be reduced by treating the landfill gas using a thermal destruction process. The three thermal destruction technologies, combustion, flaring and incineration, typically achieve destruction and removal efficiencies of 90-99.99%. EPA established target cleanup levels based on Rhode Islands Air Toxic Regulations. The annual average ambient air concentrations established in these regulations provide a risk that's within EPA's acceptable target range of 10^{-4} - 10^{-7}. With the results obtained during the RI and the removal efficiencies stated above, these technologies will achieve the target cleanup levels and will protect human health and the environment. Pilot tests will be conducted during the design phase to insure that the selected remedy is protective and monitoring will be conducted after construction to insure that it remains protective.

The present impacts to the wetlands will be remediated by removing the eroded sand and establishing vegetation. The risk of future impact will be minimized by upgrading the existing landfill closure to minimize erosion. Specifically, the remedy includes establishing a vegetative cover, stabilizing steep side slopes and upgrading the surface water management system to minimize erosion and the risks of future impacts to the wetlands.

Although an organic contaminant plume is not yet evident from the analytical data collected to date, the historical data supports the fact that a plume could emerge in the future. The potential risk of contaminating the groundwater will be minimized by minimizing infiltration to the maximum extent practical. Specifically, the selected remedy includes installing a synthetic cover on the uncovered area of the landfill to minimize infiltration and the risk of contaminating the groundwater. Also, the groundwater will be monitored on a periodic basis to insure that the selected remedy remains protective of public health and the environment.

B. The Selected Remedy Attains ARARs

This remedy will meet or attain all applicable or relevant and appropriate federal and state requirements that apply to the Site. Environmental laws which are applicable or relevant and appropriate to the selected remedial action at the L&RR Site are:

Resource Conservation and Recovery Act (RCRA)
Clean Water Act (CWA)
Safe Drinking Water Act
Fish and Wildlife Coordination Act
Executive Order 11990 (Protection of Wetlands)
Clean Air Act (CAA)
Occupational Safety and Health Administration (OSHA)
Rhode Island General Law (RIGL)

Three types of ARARs were identified during the RI/FS: location, chemical and action-specific ARARs. A brief narrative summary of these ARARs follows.

Location-Specific ARARs: Table XII-1 lists the location-specific ARARs that were identified during the planning stages of the RI/FS. This table gives a synopsis of the requirement and how it was considered in the RI/FS. For the L&RR Site, the location-specific ARARs apply primarily to the landfill and the wetlands. During the RI, the existing landfill closure was evaluated according to the requirements outlined in RCRA regulations. As discussed in Section VII, it was determined that the existing landfill closure does not minimize infiltration, does not minimize erosion and does not function with minimum maintenance. The selected remedy meets these requirements by installing a synthetic cover on the uncovered area of the landfill to minimize infiltration and by upgrading the surface water management system, stabilizing the steep side slopes, and establishing a vegetative cover to minimize erosion and maintenance. Furthermore, the selected remedy will protect the wetlands from future impacts as required by the ARARs for the wetlands such as the CWA.

Chemical-Specific ARARs: Table XII-2 lists the chemical-specific ARARs, criteria, advisories and guidance for the L&RR Site. During the RI, the chemical-specific ARARs were used to assess the contamination at the Site and to conduct the risk assessment. The table gives a synopsis of the requirement and explains how these requirements were considered in the RI/FS. The significant findings are outlined below.

The concentrations of contaminants in the groundwater at the boundary of the Site were below their drinking water maximum contaminant levels (MCLs) and the risk posed by consuming the groundwater was within EPA's acceptable range. The selected remedy includes groundwater monitoring to insure that it continues to achieve ARARs.

For the surface water, some of the samples contained contaminants (cadmium, chromium and zinc) that were slightly above aquatic water quality criteria (AWQC). However, the risk assessment indicated that the risk posed by exposure to the surface water was within EPA's acceptable range and the local environment did not appear stressed by the occasional exceedance. It is not known whether these slight exceedances of the AWQC are caused by releases from the landfill or by other causes including natural causes. Releases from the landfill that would contribute to surface water would come through groundwater, and can therefore be detected in the planned groundwater monitoring which includes cadmium and chromium on a quarterly basis. In addition, the 1983 Court Order between RIDEM and L&RR, Inc., calls for surface water monitoring. EPA believes that the selected remedy will prevent the landfill from causing or contributing to AWQC exceedances in the surface water. The groundwater monitoring plan will confirm whether or not releases of contaminants from the landfill are affecting the surface water after completion of the remedy. If after completion of the remedy releases that contribute to exceedances of AWQC are not prevented, further remedial action will be taken acording to the provisions of CERCLA and the NCP.

Finally, the existing landfill emissions from the uncapped vents exceeded Rhode Islands Air Toxic Regulations and pose a potential threat to public health. The selected remedy utilizes thermal destruction to reduce the concentration of contaminants in the landfill gas. With the results in the RI and the removal efficiency of 90-99.99%, the selected remedy will achieve these ARARs. Pilot tests will be conducted during the design phase to insure that the selected remedy achieves ARARs.

Action-Specific ARARs: Table XII-3 lists the action-specific ARARs which were common to all the containment alternatives (Alternatives 2-5). The table gives a synopsis of the requirement. During the remedial action, the selected remedy will comply with all relevant and appropriate RCRA requirements, including the general closure performance standard (40 CFR § 264.111), and the monitoring, closure and post closure requirements of 40 CFR Subparts F and G, the landfill closure requirements of § 264.310, and the other relevant and appropriate requirements of 40 CFR Subparts B-E, N and O. Because there is presently no off-site release of groundwater contamination, the relevant and appropriate portions of Subpart F are those dealing with detection monitoring, 40 CFR § 264.90-.98. The selected remedy will also comply with OSHA requirements such as those which apply to working with hazardous materials. Additionally, wetlands remediation will be conducted according to the CWA and the other requirements, listed in Table XII-1, associated with dredging and restoring wetlands. Finally, State requirements associated with transporting and utilizing municipal waste water treatment sludge will be followed during establishment of vegetation.

C. The Selected Remedial Action is Cost Effective

In the FS, a range of alternatives were developed for remediating the landfill. Three of these alternatives, Alternatives 3, 4 and 5, were equally protective and attained ARARs. Once EPA has identified alternatives that are protective and attain ARARs, EPA analyzes those alternatives to determine a cost-effective means of achieving the cleanup. Alternatives 3 and 4 were similar in cost with a net present worth of $5,062,000 and $5,490,000, respectively. Alternative 5, however, was over twice the cost of both of these alternatives with a net present worth of $11,670,000. The selected remedy will utilize either Alternative 3 or 4, the most cost effective of the alternatives developed in the FS for remediating the landfill. During design, if factors such as implementability influence the cost of these alternatives, the most cost-effective one will be chosen.

For treating the landfill gas, three technologies were developed in the FS: combustion, flaring and incineration. The costs of each of these technologies were as follows: $1,300,000, $612,000 and $1,277,000, respectively. However, the estimated costs are highly dependent on the cost of operating and maintaining the system and could vary significantly due to such things as equipment replacement costs due to corrosion. Section 121(a) of CERCLA requires EPA to take into account the total short- and long-term costs, including the cost of maintenance for the entire period during which such activities are required. Therefore, before EPA can select the most cost effective technology from these three, pilot tests are needed to assess the impacts of the L&RR landfill gases on the operating costs of each system.

Table XII-1
LOCATION-SPECIFIC ARARS
L&RR SITE

SITE FEATURES	REQUIREMENTS	STATUS	REQUIREMENT SYNOPSIS	APPLICATION FOR THE RI/FS
Landfill				
Federal Regulatory Requirements	RCRA - Standards for Owners and Operators of Permitted Hazardous Waste Facilities 40 CFR 264.13-.16	Relevant and Appropriate	General facility requirements outline waste analysis, security measures, and training requirements.	Because RCRA-listed hazardous wastes were place before 1980, RCRA Subtitle C requirements are relevant and appropriate.
	RCRA - Preparedness and Prevention (40 CFR 264.30 - 264.37)	Relevant and Appropriate	This regulation outlines safety equipment and spill-control requirements for hazardous waste facilities. Part of the regulation includes a requirement that facilities be designed, maintained, constructed, and operated so that the possibility of an unplanned release threatening human health or the environment could be minimized.	RCRA requirements were considered when evaluating the effectiveness of the present landfill, and will be further considered when evaluating the design of potential alternatives.
	RCRA - Contingency Plan and Emergency Procedures (40 CFR 264.50 - 254.56)	Relevant and Appropriate	This regulation outlines the requirements for emergency procedures to be used following explosions and fires. This regulation also requires that threats to public health and the environment be minimized.	RCRA requirements were considered when evaluating the effectivenss of the present landfill, and will be further considered when evaluating the design of potential alternatives.
	RCRA - Groundwater Protection 40 CFR 264.98	Relevant and Appropriate	Under this regulation, groundwater monitoring program requirements are outlined.	Groundwater monitoring must be considered for each alternative. During alternatives analysis, the location and depth of monitoring wells will be evaluated for use in this monitoring program.
	RCRA - Closure and Post-closure (40 CFR 264.110 - 264.120)	Relevant.and Appropriate	This requirement details the specific requirements for closure and post-closure of hazardous waste facilities.	Long-term monitoring and maintenance portions of the regulation will be considered during remedial design.

Table XII-1 - continued

LOCATION-SPECIFIC ARARs
L&RR SITE

SITE FEATURES	REQUIREMENTS	STATUS	REQUIREMENT SYNOPSIS	APPLICATION FOR THE RI/FS
Federal Regulatory Requirements (continued)	RCRA - Landfills (40 CFR 264.300 - 24.339)	Relevant and Appropriate	Covers design and operating requirements, as well as post-closure care options for landfills. Closure and post-closure care must be attained in accordance with the outlined disposal requirements.	The landfill cover must comply with requirements for disposal closure. Performance evaluation of existing cover has been completed and any potential remedial alternatives must address areas of noncompliance to attain disposal closure.
	Fish and Wildlife Coordination Act (16 U.S.C. 661)	Applicable	This regulation requires any federal agency proposing to modify a body of water to consult with the U.S. Fish and Wildlife Services. This requirement is addressed under CWA Section 404.	During the identification, screening, and evaluation of alternatives, the effects on wetlands will be evaluated. If an alternative would modify a body of water, U.S. Fis and Wildlife Services will be consulted.
State Regulatory Requirements	Rhode Island Rules for Solid Waste Management Facilities (RIGL 23 - 18.9)	Applicable	Outlines regulations for sanitary landfills. Includes initial investigation, site groundwater, operating and closure plans. Closure requirements include 24 inches of cover material to be maintained on all surfaces and faces of the landfill.	Potential remedial alternatives must addres areas of landfill cover that do not meet 24-inch requirement, as well as any other areas of noncompliance.
	Rhode Island Hazardous Waste Rules and Regulations (RIGL 23 - 18.9)	Relevant and Appropriate	These requirements correspond to RCRA hazardous waste regulations. Compliance with RCRA will generally achieve compliance with these regulations.	Where RCRA regulations have jurisdiction, these requirements will generally correspon and be attained if more stringent than RCRA.
Wetlands, Trout Brook				
Federal Regulatory Requirements	Clean Water Act (CWA) - 40 CFR Section 404	Applicable	Regulates discharges of dredged or fill material into U.S. waters.	Protection of the adjacent wetland. Applie to sedimentation caused by erosion of landfill cap fill material.
State Regulatory Requirements	Rhode Island Freshwater Wetlands Law-Rhode Island General Law (RIGL) - Title 2 Chapter 1 (2-1)	Applicable	Regulates and preserves swamps, marshes, and wetlands. Includes maintaining capacity to support wildlife and act as buffer zone for flood conditions.	Considerations such as reducing sedimentati to maintain the adjacent wetland's water storage capabilities will be addressed for the RI/FS.
	Rhode Island Water Quality Regulations (RIGL 46-12, 42-17.1, 42-35)	Applicable	Regulates restoration, enhancement, and preservation of state waters.	Potential remedial alternatives must addres this regulation because the adjacent wetlan is a state water.

Table XII-1 - continued
LOCATION-SPECIFIC ARARS
L&RR SITE

SITE FEATURES	REQUIREMENTS	STATUS	REQUIREMENT SYNOPSIS	APPLICATION FOR THE RI/FS
State Regulatory Requirements (continued)	Rhode Island Water Quality Standards (RIGL 46-12)	Applicable	Water quality standards to be maintained in state waters. Generally, a chemical-specific ARAR, but applicable since it provides physical criteria, such as Best Management Practices (BMPs), to control sedimentation.	During identification, screening, and evaluation of alternatives, BMPs will be considered to control sedimentation to the wetland caused by erosion of the landfill cover material.
Federal Criteria, Guidance, Advisories to be Considered	Wetlands Executive Order (EO 11990)	To be Considered	Prohibits the undertaking of new construction in wetlands.	This regulation will be considered during the RI/FS for use in planning remedial actions.
	EPA Guidance - "Covers for Uncontrolled Hazardous Waste Sites" (EPA/540/2-85/002)	To be Considered	Outlines the three components that offer detailed guidance for the design of a cover system which will achieve the specified performance standards of RCRA landfill covers.	These design guidance criteria were used for the preliminary cover assessment as a baseline for determining the compliance of the existing cover with RCRA requirements. These criteria will also be considered during alternative development and evcluation.

Table XII-2
CHEMICAL-SPECIFIC ARARS AND CRITERIA, ADVISORIES, AND GUIDANCE
L&RR SITE

Requirement Type	Requirement	Requirement Synopsis	Consideration in the RI/FS
Federal Regulatory Requirements	SDWA - Maximum Contaminant Levels (MCLs) (40 CFR 141.11 - 141.16)	MCLs have been promulgated for a number of organic and inorganic contaminants. These levels regulate the concentration of contaminants in public drinking water supplies, but may also be considered relevant and appropriate for groundwater aquifers used for drinking water.	When the risks to human health due to consumption of groundwater were assessed, contaminant concentrations were compared to their MCLs. Only iron and manganese exceeded their secondary levels. Secondary standards are not health-based; therefore, iron and manganese are not considered contaminants of concern.
Federal Criteria, Advisories, and Guidance			
	Federal Ambient Water Quality Criteria (AWQC)	Federal AWQC are health-based criteria that have been developed for 95 carcinogenic and noncarcinogenic compounds.	AWQC were considered in characterizing risks to human health and aquatic organisms due to contaminant concentrations in the wetlands and Trout Brook. Because this water is not used as a drinking water source, the criteria developed for aquatic organisms were used,
	Health Advisories (EPA Office of Drinking Water)	Health advisories are estimates of risk due to consumption of contaminated drinking water; they consider noncarcinogenic effects only.	Health advisories were considered for contaminants in groundwater that may be used for drinking water.
	EPA Risk Reference Doses (RfDs)	RfDs are dose levels developed by EPA for noncarcinogenic effects.	EPA RfDs were used to characterize risks due to exposure to groundwater contaminants. They were considered for noncarcinogens including 2-butanone and lead.
	EPA Carcinogen Assessment Group Potency Factors	Potency factors are developed by EPA from Health Effects Assessments or evaluation by the carcinogen assessment group.	EPA carcinogenic potency factors were used to compute the individual incremental cancer risk resulting from exposure to arsenic.

Table XII-2 - continued

CHEMICAL-SPECIFIC ARARs AND CRITERIA, ADVISORIES, AND GUIDANCE
L&RR SITE

Requirement Type	Requirement	Requirement Synopsis	Consideration in the RI/FS
	Acceptable Intake - Chronic (AIC) and Subchronic (AIS) - EPA Health Assessment Documents	AIC and AIS values are developed from RfDs and HEAs for noncarcinogenic compounds.	AIS and AIC values were used to characterize the risks due to several noncarcinogens in groundwater and surface water. These noncarcinogens include 2-butanone, trans-1,2-dichloroethene, 1,1-dichloroethane, lead, and zinc.
Rhode Island Criteria, Advisories, and Guidance	Rhode Island Water Quality Standards (RIGL 46-12)	Freshwater guidelines were developed for several organics and inorganics.	Water quality standards were compared to AWQCs for compounds such as toluene and arsenic.
	Rhode Island Air Toxics Regulation	Emissions standards developed for traditional and nontraditional stationary sources including landfill vents.	Air modeling results were compared to these regulations when airborne risks were characterized.

Table XII-3

ACTION-SPECIFIC ARARS

LANDFILL AND RESOURCE RECOVERY

	REQUIREMENTS	STATUS	REQUIREMENT SYNOPSIS
Federal Regulatory Requirements	RCRA - Subpart B: General Facility Standards	Relevant and Appropriate	General facility requirements outline waste analysis, security measures, and training requirements.
	RCRA - Subpart C: Preparedness and Prevention (40 CFR 264.30 - 264.37)	Relevant and Appropriate	This regulation outlines safety equipment and spill-control requirements for hazardous waste facilities. Part of the regulation includes a requirement that facilities be designed, maintained, constructed, and operated to minimize the possibility of an unplanned release that could threaten human health or the environment.
	RCRA - Subpart D: Contingency Plan and Emergency Procedures (40 CFR 264.50 - 264.56)	Relevant and Appropriate	This regulation outlines the requirements for emergency procedures to be used following explosions and fires. This regulation also requires that threats to public health and the environment be minimized.
	RCRA - Subpart F: Releases From Solid Waste Management Units	Relevant and Appropriate	Under this regulation, groundwater monitoring program requirements are outlined.
	RCRA - Subpart G: Closure and Post-Closure (40 CFR 264.110 - 264.120)	Relevant and Appropriate	This requirement details the specific requirements for closure and post-closure of hazardous waste facilities.

Table XII-3 - continued
ACTION-SPECIFIC ARARS

LANDFILL AND RESOURCE RECOVERY

	REQUIREMENTS	STATUS	REQUIREMENT SYNOPSIS
Federal Regulatory Requirements (continued)			
	RCRA - Subpart N: Landfills (40 CFR 264.300 - 264.339)	Relevant and Appropriate	Covers design and operating requirements, as well as post-closure care options for landfills. Closure and post-closure care must be attained in accordance with either the outlined disposal requirements or by the site-specific alternate method.
	RCRA - Subpart O: Incinerators (40 CFR 264.340 - 264.599)	Relevant and Appropriate	This regulation specifies the performance standards, operating requirements, monitoring, inspection, and closure guidelines of any incinerator burning hazardous waste.
	Clean Water Act (CWA) (Section 404).	Applicable	Regulates discharges of dredged or fill material into U.S. waters.
	Clean Air Act - National Air Quality Standards for Total Suspended Particulates (40 CFR 50.6 - 50.7)	Relevant and Appropriate	This regulation specifies maximum primary and secondary 24-hour concentrations for particulate matter.
	OSHA - General Industry Standards (29 CFR 1910)	Applicable	This regulation specifies the 8-hour, time-weighted average concentrations for various organic compounds.
	OSHA - Safety and Health Standards for Federal Service Contracts (29 CFR 1926)	Applicable	This regulation specifies the type of safety equipment and procedures to be followed during site remediation.
	OSHA - Recordkeeping, Reporting, and Related Regulations (29 CFR 1904)	Applicable	This regulation outlines the recordkeeping and reporting requirements for an employer under OSHA.
	DOT Rules for the Transportation of Hazardous Materials (49 CFR 107, 171.1 - 171.500)	Applicable	This regulation outlines procedures for the packaging, labeling, manifesting, and transport of hazardous materials.
	Fish and Wildlife Coordination Act (16 U.S.C. 661)	Applicable	This regulation requires any federal agency that proposes to modify a body of water to consult with the U.S. Fish and Wildlife Services. This requirement is addressed under CWA Section 404.

Table XII-3 - continued

ACTION-SPECIFIC ARARS

LANDFILL AND RESOURCE RECOVERY

	REQUIREMENTS	STATUS	REQUIREMENT SYNOPSIS
State Regulatory Requirements			
	Rhode Island Rules for Solid Waste Management Facilities (November 1, 1982)	Applicable	Outlines regulations for sanitary landfills. Includes initial investigation, site groundwater, and operating and closure plans. Closure requirements include 24 inches of cover material to be maintained on all surfaces and faces of the landfill.
	Rhode Island Hazardous Waste Rules and Regulations (June 28, 1984)	Relevant and Appropriate	These requirements correspond to RCRA hazardous waste regulations. Compliance with RCRA will generally achieve compliance with these regulations.
	Rhode Island Freshwater Wetlands Law - Rhode Island General Law (RIGL) - Title 2 Chapter 1 (2-1)	Applicable	Regulates and preserves swamps, marshes, and wetlands. Includes maintaining capacity to support wildlife and act as buffer zone for flood conditions.
	Rhode Island Water Pollution Control Law (RIGL 46 - 12)	Relevant and Appropriate	These requirements correspond to CWA regulations. Compliance with the relevant sections of CWA will generally achieve compliance with these requirements.
	Rhode Island Water Quality Regulations (RIGL 46-12, 42-17.1, 42-35)	Applicable	Restoration, enhancement, and preservation of state waters.
	Rhode Island Water Quality Standards (RIGL 46-12)	Applicable	Water quality standards to be maintained in state waters. Generally, a chemical-specific ARAR, but applicable because it provides physical criteria such as Best Management Practices (BMPs) to control sedimentation.
	Rhode Island Air Pollution Control Regulations (August 2, 1967)	Relevant and Appropriate	Details the requirements, limitations, and exemptions of state air emission regulations for specified substances.
	Rhode Island Air Pollution Control Act (23-23, 23-23.1)	Relevant and Appropriate	Outlines the policy of preserving, protecting, and improving the air resources of Rhode Island.

Table XII-3 – continued

ACTION-SPECIFIC ARARS

LANDFILL AND RESOURCE RECOVERY

	REQUIREMENTS	STATUS	REQUIREMENT SYNOPSIS
State Regulatory Requirements			
	Rhode Island Rules and Regulations Pertaining to the Disposal, Utilization, and Transportation of Wastewater Treatment Facility Sludge. (September 1985)	Applicable	This requirement applies to the disposal of sludge by land application or incorporation of the sludge into the soil for silvicultural purposes.
	Rhode Island Air Toxic Regulations (Regulation No. 22)	Applicable	Limits the emission of listed substances from stationary sources.
Federal Criteria, Guidance, Advisories to be Considered			
	Wetlands Executive Order (EO 11990)	To be Considered	Prohibits the undertaking of new construction in wetlands, which includes dredging.
	EPA Guidance Document - "Covers for Uncontrolled Hazardous Waste Sites" (EPA/540/2-85/002)	To be Considered	Outlines the three components that offer detailed guidance for the design of a cover system which will achieve the specified performance standards of RCRA landfill covers.

D. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

During the FS, EPA developed one alternative that was considered a permanent solution, Alternative 6. This alternative consisted of excavating the landfill wastes; incinerating the removed wastes at an off-site, RCRA compliant facility; and, wetlands sediment removal and disposal. However, this alternative was eliminated from further consideration during the initial screening process for a number of reasons. The significant reasons are summarized below.

First, significant public health and environmental risks would be posed by its implementation. Excavation of the wastes is likely to release VOCs and particulates to the atmosphere, including asbestos and metal fibers known to be disposed at the Site, creating both on-site and off-site risks due to inhalation. Second, because the area of hazardous waste cannot be clearly defined, it was assumed that all of the landfill wastes must be removed and treated. It would take approximately 90 years to implement this alternative. Third, incinerator capacity nation wide is insufficient for the quantity of wastes in the landfill and extremely costly. The estimated cost was $2.6 billion dollars. A more detailed discussion of the reasons for elimination of the excavation and treatment alternative is presented in Appendix AA of the RI/FS Report.

In conclusion, the long term uncertainties associated with the selected remedy, a land disposal remedy, are much less than the risks posed, the implementation problems and the costs associated with implementing a permanent remedy. Furthermore, the selected remedy includes Site monitoring to insure that it remains protective. Therefore, the selected remedy utilizes permanent solutions and alternative treatment to the maximum extent practical.

The selected remedy identifies three technologies to treat the landfill gas. One of these technologies, combustion is considered a resource recovery technology because it generates electricity while destroying the hazardous constituents in the gas. This factor may reduce the costs of implementing this technology. EPA will consider this factor when selecting the gas treatment technology during the design phase.

E. The Selected Remedy Partially Satisfies the Preference for Treatment as a Principal Element

As stated above, excavation and treatment of the source material is impractical, involves unacceptable risks and is not cost effective. The selected remedy has three components: upgrading the landfill closure; treating the landfill gas and monitoring the Site. The second component, treating the landfill gas, will reduce the volume, toxicity and mobility of the hazardous substances in the gas and the risks posed from exposure. Therefore, the gas treatment component partially satisfies the preference for treatment as a principal element of the remedy.

XIII. STATE ROLE

The Rhode Island Department of Environmental Management (RIDEM) has reviewed the various alternatives presented in the Feasibility Study and EPA's preferred alternative as presented in the Proposed Plan. The State has also reviewed the Remedial Investigation and Feasibility Study to determine if the selected remedy is in compliance with applicable or relevant and appropriate State environmental laws and regulations. The RIDEM concurs with the components of the selected remedy for the L&RR Site which are consistent with the 1983 Court Order and Consent Order and Agreement between RIDEM and L&RR, Inc. In regards to the additional components, RIDEM recognizes that they are not inconsistent with the 1983 Court Order and provide additional protection. RIDEM also recognizes that EPA's selected remedy, are required by CERCLA and the NCP. A copy of the declaration of concurrence is attached as Appendix C.

APPENDIX A

RESPONSIVENESS SUMMARY

Landfill & Resource Recovery Site

LANDFILL & RESOURCE RECOVERY SITE
Responsiveness Summary

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IV. REMAINING CONCERNS 50

Preface

The U.S. Environmental Protection Agency (EPA) held a public comment period from July 20, 1988 through September 2, 1988 to provide an opportunity for interested parties to comment on EPA's Remedial Investigation (RI), Feasibility Study (FS), and Proposed Plan for the Landfill and Resource Recovery Site (L&RR) in North Smithfield, Rhode Island. On August 10, 1988, EPA held an informal public hearing to provide an opportunity for the public to submit oral comments to EPA.

The purpose of this Responsiveness Summary is to document EPA's responses to the comments and questions raised during the public comment period. EPA considered all of the comments summarized in this document prior to the Agency's final selection of a remedy for the L&RR Site.

This Responsiveness Summary is organized into the following sections:

I. Responsiveness Summary Overview -- This section briefly outlines the history of the Site and the remedial alternatives evaluated in the FS, including EPA's preferred alternative. This section also includes an overview of the comments that EPA received during the public comment period.

II. Background on Community Involvement and Concerns -- This section provides a brief history of community interests and concerns regarding the L&RR Site.

III. Summary of Comments Received and EPA Responses -- This section provides a detailed summary of both the written and oral comments received during the public comment period and provides EPA's responses to these comments. Part 1 summarizes comments received from citizens and other community interest groups. Part 2 summarizes comments from the Rhode Island Department of Environmental Management (RIDEM). Part 3 summarizes comments received from potentially responsible parties (PRPs). All of the parts are arranged by subject matter.

IV. Remaining Concerns -- This section describes concerns that will continue to be addressed by EPA during design and implementation of the selected remedy.

Attachment A -- This attachment includes a list of the community relations activities conducted by RIDEM and EPA during the remedial history of the Site.

I. RESPONSIVENESS SUMMARY OVERVIEW

A. Site Background

The L&RR Site is an inactive landfill that covers approximately 28 acres of a 36 acre parcel of land on Oxford Turnpike in North Smithfield, Rhode Island. The landfill was reportedly used from 1927 until 1985 for the disposal of commercial, industrial, and residential waste. Between 1977 and 1979, the landfill reportedly accepted hazardous waste. From 1974 to 1985, the landfill was operated by Landfill and Resource Recovery, Incorporated (L&RR, Inc.), the current property owners.

In 1979, L&RR, Inc. covered what they defined as the hazardous waste area of the landfill with a synthetic cover. The Site was added to the Superfund National Priorities List (NPL), a list of the nation's hazardous waste sites eligible to receive federal Superfund monies for cleanup, in 1982.

In 1985, the landfill owners ceased accepting wastes and began closing the landfill as specified in plans included in a 1983 Court Order and Consent Order and Agreement, referred to in the remainder of this document as "the 1983 Court Order", between RIDEM and L&RR, Inc. As part of this process, the landfill owner covered approximately 80% of the landfill with another synthetic cover and soil to support vegetation.

In 1988, EPA completed a comprehensive study at the L&RR Site called a Remedial Investigation/Feasibility Study (RI/FS). The RI was conducted to define the nature and extent of contamination in the groundwater, air, and nearby surface waters. The FS was conducted to identify and evaluate remedial alternatives that would be effective in addressing contamination at the Site. The Record of Decision (ROD) is written at the end of the RI/FS phase of the Superfund process and describes EPA's selected remedy as well as EPA's rational for selection.

B. Overview of Remedial Alternatives and EPA's Proposed Plan

Using the information gathered during the RI, EPA identified three general objectives for the Site: 1) treat the landfill gas to reduce the potential public health risks from exposure to the landfill vent emissions; 2) restore the wetlands that have been affected by erosion from the landfill and prevent future adverse impacts caused by erosion; and 3) close, maintain, and monitor the landfill so that it is protective of public health and the environment and complies with federal and state regulations.

After identifying site-specific objectives, EPA developed and conducted a detailed analysis of five remedial alternatives and three gas treatment technologies for the Site. The remedial alternatives and the gas treatment technologies analyzed for the L&RR Site in the FS are summarized in the following sections.

1. Remedial Alternatives

No Action (Alternative 1). This alternative would consist solely of long-term groundwater monitoring.

Vegetation Establishment (Alternative 2). This alternative would involve upgrading the existing landfill closure by covering the landfill with 24 inches of soil and planting vegetation. This alternative would also include the following components: removing sediments from and reseeding the wetlands; installing a fence around the site; developing a landfill post-closure plan; upgrading the surface water runoff management system; and installing a passive gas collection system.

Synthetic Cover Installation/Slope Stabilization (Alternative 3). This alternative would include all of the components of Alternative 2 but would also involve stabilizing the steeply sloping sides of the landfill in the northeast portion of the Site by grading the slope and adding a terrace. Then a synthetic cover would be installed over the stabilized slope. Additional soil would be placed on the synthetic cover and vegetation would be established. In addition, this alternative includes installing a gas collection and treatment system rather than the passive gas collection system in Alternative 2.

Synthetic Cover Installation/Slope Flattening (Alternative 4). This alternative is identical to Alternative 3 except the steep slopes would be stabilized by flattening them to a greater degree.

RCRA Cover Guidance (Alternative 5). This alternative would involve flattening and covering the steep sides of the landfill as well as placing a clay barrier, drainage layers and a new vegetative cover over the entire landfill. This alternative was developed according to an EPA guidance document for constructing covers for hazardous waste sites. Alternative 5 also would include all of the other components included in Alternatives 3 and 4 and gas treatment.

2. Gas Treatment Technologies

Combustion. Combustion would entail burning the landfill gas in an internal combustion engine to produce electricity as a useful by-product.

Flaring. The flaring process would burn the landfill gas in a manner similar to combustion but does not produce electricity.

Incineration. Incineration would burn landfill gases at high temperatures in a closed reaction chamber.

3. EPA's Proposed Plan

EPA's selection of a preferred alternative, as outlined in the Proposed Plan, was the result of a comprehensive evaluation and screening process. EPA's Proposed Plan included the following three components:

- o The existing landfill closure would be upgraded to effectively contain the wastes. EPA selected Alternatives 3 and 4 as the Agency's preferred alternatives for this component of the Proposed Plan. EPA will choose one of the two alternatives during the remedial design phase of the project after site-specific tests have been conducted;
- o A landfill gas collection and thermal destruction system would be constructed to treat the landfill gas. EPA has chosen three thermal destruction technologies for treatment of the landfill gas. The specific technology will be selected by EPA during the design phase of the project, when specific information regarding the performance of each technology is available; and,
- o The groundwater and air would be monitored on a regular basis to ensure the Site remains protective of public health and the environment.

For more details on the FS alternatives and EPA's preferred alternatives, refer to the Proposed Plan.

C. Overview of Comments Received During the Public Comment Period

EPA received comments from three community members, RIDEM, technical and legal representatives of L&RR, Inc., and General Dynamics. In Section III of this document, these comments are summarized and EPA responses are provided. A general overview of the comments received is provided below.

1. Overview of Comments from Community Members

Community members, including a representative of Protect Our Water, a local citizens' group, indicated general support of EPA's Proposed Plan. However, each commenter expressed serious concern about the possibility that the landfill owner might operate the landfill gas treatment system. Area residents also expressed concern that the groundwater monitoring wells are not close enough together to ensure that a contaminant plume would be detected. Community comments and EPA responses are provided in Section III, Part 1 of this document.

2. Overview of Comments from RIDEM

In general, RIDEM recommends that EPA consider the implementation of the closure measures outlined in the 1983 Court Order between RIDEM and L&RR, Inc., combined with wetlands restoration as the remedy for the L&RR Site. RIDEM stated that EPA should provide additional justification to support the need for a synthetic cover on the uncovered portion of the landfill. RIDEM's comments and EPA responses are provided in Section III, Part 2 of this document.

3. Overview of Comments from the Potentially Responsible Parties (PRPs)

Wehran Engineers, Inc., and Dean Temkin, Esq., submitted extensive comments on behalf of the owner and operator of the L&RR Site. Both commenters stated their strong belief that the 1983 Court Order between RIDEM and L&RR, Inc., includes appropriate and adequate measures to ensure protection of public health and the environment, and that no additional remedy is needed. Other general issues addressed by the commenters included the following:

- The appropriateness of the risk assessment exposure assumptions relating to the landfill vent emissions;
- The validity of the model used by EPA to measure the performance of the landfill;
- EPA's interpretation of which federal and state regulations must be complied with; and,
- The appropriateness of including wetlands remediation as part of a Superfund action.

The commenters also included clarifications of the Site history, particularly relating to the 1983 Court Order between RIDEM and L&RR, Inc. PRP comments and EPA responses to these comments are provided in Section III, Part 3 of this document.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

According to Site records, community concern about and interest in the L&RR Site has been moderate to strong since the mid 1970s, when trucks travelling to and from the landfill caused most neighbors to become aware of the landfill for the first time. In response to complaints about L&RR and other hazardous waste sites in the area, two citizens groups formed -- Protect Our Waters (POW) and Saving the Environment of North Smithfield (SENS). These groups were very active in the late 1970s, coordinating media events, disseminating information about the sites, and organizing rallies. The groups repeatedly sought to close L&RR. Although the efforts met with little immediate success, POW was instrumental in the passage of two state laws to ban hazardous and solid waste facilities from being located over aquifers.

In 1978, the North Smithfield Town Council formed a task force on hazardous waste that included members of POW and SENS. One of the goals of the task force was to build a case to convince the state legislature, the courts, RIDEM, and EPA to take some type of action at L&RR. In 1979, when the hazardous waste portion of the landfill was closed, the task force disbanded and POW and SENS became less active. At present, community members including members of POW remain very interested in area environmental issues and have expressed concerns about preventing risks to public health from exposure to hazardous waste, protecting the Slatersville Reservoir, and managing community growth and development.

III. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES TO COMMENTS

This Responsiveness Summary addresses the comments received by EPA on the Remedial Investigation (RI), Feasibility Study (FS), and Proposed Plan for the Landfill and Resource Recovery Site (L&RR Site) in North Smithfield, Rhode Island. During the public comment period, EPA received written comments from six parties and the Rhode Island Department of Environmental Management (RIDEM). There were two oral comments given at the public hearing held on August 10, 1988. Copies of the hearing transcript are available at the information repository located in the Municipal Annex Building in North Smithfield and at the EPA Records Center, 90 Canal Street, in Boston, Massachusetts.

In Part 1 of this section, comments received from the community are summarized and EPA responses are provided. Part 2 summarizes and provides EPA responses for comments received from RIDEM. Part 3 summarizes and provides EPA responses to comments submitted on behalf of Potentially Responsible Parties (PRPs).

PART 1. COMMUNITY COMMENTS

A. CONCERNS REGARDING THE RESPONSIBLE PARTY

Several commenters (area residents and members of Protect Our Water) raised specific concerns regarding the past and future activities of the landfill owner.

1. Comment:

Each of the four written comments EPA received from community members referred to a newspaper article stating that the landfill owner wants to burn the landfill gas and create electricity for sale. Members of Protect Our Water expressed specific concern that the gas treatment system would be operated for profit by the landfill owners, stating that the landfill owners have never evidenced concern for public health and welfare. The commenters stated further that any profit gained from selling electricity generated from the landfill should be returned to the government or used toward the closure of the Site.

EPA Response:

The selected remedy utilizes thermal destruction to treat the landfill gas. EPA will choose one of the following three thermal destruction technologies during the design phase: combustion, flaring or incineration. All three burn the gas to destroy the hazardous constituents but only one has the potential to produce electricity, combustion. This

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technology may not be a profit making technology due to the operation and maintenance costs. Pilot tests will be conducted during the design phase to provide EPA with information necessary to identify which of the three technologies is protective and cost effective.

EPA will negotiate with all of the potentially responsible parties, including the site owners, to implement the remedy. If the responsible parties agree to implement the remedy, they must implement the remedy in accordance with the Comprehensive Environmental Response and Liability Act (CERCLA) which requires it to be protective of public health and the environment. EPA will monitor the design and construction of the remedy to insure that it is protective. Furthermore, the selected remedy includes an air monitoring program to insure that during operation, the selected remedy remains protective.

2. Comment:

Protect Our Water stated their concern with the landfill owners being the operators and maintainers of a gas collection system that is necessary to safeguard air quality and asked the following specific questions regarding the proposed gas treatment system:

1. Which of the three gas collection systems proposed in the EPA report is the system of choice for the situation as it exists at L&RR? We ask this noting that only combustion, of the three systems discussed, makes the gas available for sale and also noting that incineration is the most efficient in the destruction of contaminants.
2. Who will determine if the system is properly operating?
3. Who will maintain the system?
4. What will happen if the system becomes unprofitable?
5. Who will determine when and if the system should be discontinued?

EPA Response:

As stated in response to comment #2, EPA will select the specific gas treatment technology during the design phase, after pilot tests are conducted. A monitoring plan will be implemented to insure that the system is protective. EPA and RIDEM will review the monitoring data on a periodic basis to insure that the system remains protective.
If the responsible parties agree to implement the remedy, they will be responsible for maintaining the system. The

selected remedy includes a post-closure plan which specifies routine inspections and maintenance requirements.

The system will be operated as long as necessary to reduce the risks from exposure to the landfill gas. EPA will decide when the system is no longer needed. EPA doubts that any of the systems will be profitable because of operation and maintenance costs. However, this issue will not influence EPA's decision on whether treatment is needed.

B. GROUNDWATER MONITORING

1. Comment:

Protect Our Water and a community resident expressed their concern with the great distances between monitoring wells in place at the Site. In particular, the group is concerned about protecting the Slatersville Aquifer, which provides one third of the town's water supply. The organization recommended that EPA install three additional monitoring wells in specific locations. They stated that the estimated $30,000 cost to install the three additional wells is ~~relatively small in compariso~~n with the $6 million EPA proposes to spend to implement the Proposed Plan.

EPA Response:

A number of factors must be considered when establishing a network of groundwater monitoring wells at a site. Presently there are 14 groundwater monitoring wells installed around the perimeter of the Site. Nine of these wells were installed by the present Site owner. After reviewing hydrologic and geologic information for the Site, EPA installed five additional monitoring wells during the RI/FS to gather information to characterize contamination at the Site. In response to this concern, EPA reviewed once again all the data collected to date and established a revised long-term groundwater monitoring plan which is outlined in the Record of Decision (ROD). This plan requires a new cluster of wells. This cluster will have two wells and will be located between monitoring well clusters CW-6 and CW-7. The specific location of this cluster will be decided during the design phase. Given the geologic conditions at the Site, this monitoring well network will identify a contaminant groundwater plume migrating from the Site.

C. MISCELLANEOUS

1. Comment:

One resident stated his belief that the contamination at the Site should be removed and neutralized, minimizing the threat of spreading contamination in the future.

EPA Response:

During the Feasibility Study, EPA developed an alternative that would permanently destroy the source of contamination at the Site. This alternative consisted of excavating the wastes and treating them in an incinerator. This alternative was not chosen as the selected remedy for the following reasons. First, significant public health and environmental risks would be posed by its implementation. Excavation of the wastes is likely to release volatile organic compounds (VOCs) and particulates such as asbestos into the atmosphere creating on-site and off-site risks from inhalation. Second, since the location of the hazardous wastes is unknown, EPA assumed that all of the wastes must be removed and treated. This would take approximately 90 years to implement. Third, incinerator capacity nation wide is insufficient for the quantity of wastes available. Finally, this alternative would cost nearly 2 billion dollars to implement.

2. Comment:

One citizen took exception to an EPA report that stated that the landfill accepted waste for disposal since 1927. The commenter stated that he is able to produce evidence disproving the date in question.

EPA Response:

It was stated in the RI/FS Report that wastes had reportedly been accepted for disposal at the Site since 1927. This information was based on discussions with past owners and other people with historical knowledge of the Site. EPA would welcome any information regarding historical waste disposal activities at the Site.

PART 2. RIDEM COMMENTS

A. TECHNICAL CONCERNS REGARDING EPA INVESTIGATIONS AND THE PROPOSED PLAN

Formal comments from the State of Rhode Island were submitted by the Department of Environmental Management (RIDEM).

1. Comment:

RIDEM has questions about the runoff and infiltration quantities projected from the modelling of the existing cover system at the landfill. The Department requests a more detailed explanation of the modelling procedures, capabilities, and results. RIDEM is interested in how the data influences EPA's selection of the remedy. In addition to the RIDEM comment, Wehran Engineering, the consultant for L&RR, Inc., also commented on the appropriateness of the methods used by EPA to predict the infiltration and runoff quantities. The response to this comment is presented in Part 3.A.2.

EPA Response:

Two methods were utilized to assess infiltration in the landfill and specifically the area without a synthetic cover, the Hydrogeologic Evaluation of Landfill Performance (HELP) model, Version I, and the Thornthwaite and Mather water balance model as republished by Fenn, Hanley and DeGeare, in 1977. Both models are designed to predict infiltration based on, among other things, rainfall and runoff characteristics and both are controlled by assumptions and input parameters. Its also important to note that both methods give approximations based upon impirical data and reasonable assumptions.

In response to Wehran's comments, EPA reviewed all of the methods utilized and the results obtained. It was interesting to note that Wehran Engineering calculated two different results using the same model. In 1983, Wehran performed a water balance for the uncovered area of the landfill using the method of Thornthwaite as modified by Fenn and calculated an infiltration of 19.3 inches/yr. Using this same method in their September 1988 comments on EPA's RI/FS, Wehran calculated a value of 6.8 inches/yr. These differences demonstrate the variation in infiltration that can result when different assumptions are used with the method. Using the HELP Model, EC Jordan, EPA's consultant, calculated infiltration as 27.64 inches/yr. In response to Wehran's comment, EC Jordan recalculated infiltration using the Thornthwaite method as modified by Fenn with similar assumptions as those utilized in the HELP model calculations. In this instance, Jordan's calculations resulted in an infiltration of 16 inches/yr (See Memo from EBASCO dated September 26, 1988 in the Administrative Record).

EPA agrees with the Wehran comment that the HELP model is limited in its ability to accurately represent slopes greater than 10%. The HELP model represents a conservative approach which has been utilized at many sites with slopes steeper than 10%. EPA further agrees that the Thornthwaite method, as modified by Fenn, is a more appropriate method for representing the infiltration at the L&RR Site. However, the Thornthwaite method, as modified by Fenn, results in a range of values for infiltration between 6.8 in/yr and 19.3 in/yr. As Wehran points out in their comment, the results are strongly influenced by the assumptions and in particular the assumed runoff coefficient. Without site-specific information and information concerning the input assumptions made by Wehran, EPA cannot evaluate which of the approximations calculated is a closer representation of the actual field conditions at the L&RR Site.

Based on a review of EC Jordan's assumptions and results, EPA believes that the actual infiltration in the uncovered area could realistically be in the range between 6.8 in/yr and 19.3 in/yr which represents 185,000 gallons/acre/yr and 524,000 gallons/acre/yr, respectively. The maximum infiltration calculated for the rest of the landfill, which has a synthetic cover as part of the cover system, was estimated to be 7,690 gal/acre/yr. Given the long-term uncertainties associated with land disposal and the lack of information regarding the location of the wastes, the amount and types of hazardous wastes disposed and the hydrologic flow in the landfill, EPA finds this range of infiltration in the uncovered area unacceptable. In order to meet the objective of the objectives of CERCLA, to protect human health and the environment and to meet applicable relevant and appropriate requirements (ARARs), the synthetic impermeable membrane is necessary on the uncovered area of the landfill.

2. Comment

RIDEM requests that EPA consider alternative groundwater monitoring programs that would provide adequate monitoring but include flexibility in the frequency and/or parameters chosen, dependent on the trends in analytical data collected.

EPA Response:

EPA established a groundwater monitoring program in the ROD that was different from the ones discussed in the RI/FS

Report. The monitoring plan is outlined below and may be revised based on trends in analytical data.

Wells:			
	MW-101	CW-5 A,B,C	(15 wells)
	MW-102 A,B	CW-6 A,B,C	
	MW-103 A,B	CW-7 A,C*	
	MW-104 A,B**		

* EPA does not think that CW-7B is needed.
** MW-104 is a new well cluster located between CW-6 and CW-7.

Parameters:

Quarterly:	VOCs	Indicators	Metals
		Chloride	Arsenic
		pH	Iron
		Temperature	Lead
		Specific Conduct.	Manganese
			Cadmium

Annually: Barium, chromium, fluoride, mercury, nitrate, selenium and silver (from the 1983 Court Order)

3. Comment:

RIDEM requests a more detailed cost analysis breakdown of the associated operation and maintenance costs that are anticipated.

EPA Response:

A detailed cost breakdown for each alternative is found in Appendix BB in the RI/FS Report. Its important to note that the cost analysis in the FS is primarily conducted to provide EPA with an estimated comparative cost for each alternative. These estimates are made with a number of assumptions and the actual costs may vary between -30 and +50 percent. The detailed cost information is developed during the design phase.

Its also important to note that as discussed in response to comment #2, the groundwater monitoring plan established in the ROD is different than the one outlined in the FS. EPA estimates the costs for this plan will be as follows:

VOCs	$225/smpl x 15 smpl/qtr x 4 qtr/yr	= $13,500/yr
Metals	$80/smpl x 15 x 4	= $4,800/yr
Indicators	$40/smpl x 15 x 4	= $2,400/yr
C.O. Metals	$160/smpl x 15 x 1	= $2,400/yr
Total Analytical Costs:		= $23,100/yr
2 people x 3 days x 8 hrs x $20/hr x 4 qtr/yr		= $3,840/yr
Total Sampling Costs:		= $26,940/yr

4. Comment:

RIDEM has questions about the results of the air monitoring at the landfill and the risk assessment developed based on this data. RIDEM believes that more accurate analytical results are needed in order to develop an appropriate risk analysis.

EPA Response:

EPA believes that the results are appropriate and sufficient for the purpose of selecting a remedy for the Site. The difficulties encountered at the Site such as the high moisture content and high pollutant concentrations of the gas made the use of conventional sampling techniques such as sorbent traps tenuous. The results were based on techniques designed specifically for L&RR after standard sampling methodology failed.

EPA's conservative position is that although there may be questions regarding the validity of the quantitative data, qualitatively, the risk assessment justifies the necessity for gas treatment.

5. Comment:

RIDEM stated that the Department and the owners of L&RR entered into a Consent Agreement in July 1983 (the 1983 Court Order) which addressed closure measures for the landfill. Many of the components of EPA's Proposed Plan are similar to the requirements outlined in the existing Consent Order and Agreement. The restoration of wetlands and the addition of a synthetic cover on the northeast portion of the landfill have not been included as part of the closure plans submitted to date. The Department agrees that compliance with all applicable wetlands requirements must be addressed, in addition to all of the other closure measures required under the 1983 Court Order. The Department also agrees that installing the additional cover on the northeast side slopes would further reduce infiltration of liquids into the landfill; however, given the concerns identified in the Department's first comment (A-1, above), the Department requests that EPA provide further justification for the proposed cap.

EPA's Response:

There are a number of reasons why EPA is proposing to upgrade the present landfill closure and, more specifically, install a synthetic cover and stabilize the slopes on the northeast portion of the Site. EPA's primary reasons for installing the synthetic cover is to protect public health and the environment and attain ARARs. The installation of the synthetic cover will protect the groundwater and insure compliance with the provisions of the RCRA Subtitle C regualtions (40 CFR 264).

EPA considered the following facts when selecting the remedy for the Site. First, the landfill is situated over the Slatersville Aquifer which is designated as a potential future drinking water source. Second, EPA has no definitive information regarding the location, amount and types of hazardous wastes within the landfill. Third, EPA also has no information regarding the hydrologic flow patterns within the landfill. There is a potential that the flow could be channelized to areas containing the hazardous wastes. Fourth, although presently there is no indication of an organic contaminant plume migrating from the Site, there is a potential that one could emerge in the future due to transport mechanisms, such as gravity, that occur regardless of the amount of infiltration. In light of the fact that we know hazardous wastes were disposed of in the Site, there are three possible explanations for the groundwater monitoring results seen to date. First, the hazardous contaminants have not yet entered the groundwater. Second, the groundwater containing the hazardous contaminants has not yet reached the boundary of the Site. Third, the existing landfill conditions, such as the natural hydrologic and geologic conditions within the landfill, the quantity of wastes disposed and the existing cover, could be preventing the generation or detection of a groundwater plume at this time. If the first two explanations are correct, we can expect to see an organic contaminant plume in the future. In light of all of these knowns and unknowns, EPA believes that it is necessary to protect the groundwater and to minimize infiltration to be protective of public health and the environment.

The statutory requirements established in CERCLA mandate that EPA select a remedy that meets ARARs. In order to comply with the RCRA Subtitle C regulations (40 CFR 264), the landfill cover must minimize infiltration as discussed in response to comment 1. A synthetic cover over the entire landfill will minimize infiltration.

B. ALTERNATIVE PREFERENCE

1. Comment:

RIDEM recommends that EPA consider the implementation of the closure measures outlined in the 1983 Court Order, in addition to wetland restoration, as an effective and appropriate remedy for the L&RR Site.

EPA Response:

The existing closure conducted to date under the 1983 Court Order between RIDEM and L&RR, Inc., was evaluated during the RI/FS. The existing closure conducted to date does not meet the requirements of CERCLA. More specifically, the existing cover does not protect the groundwater. In addition, the existing surface water drainage system and vegetation establishment does not minimize erosion. Erosion from the landfill has severely impacted and continues to deposit soil in the wetlands. Before the wetlands are remediated, the landfill erosion must be minimized; otherwise, continuous wetland remediation will be needed. The 1983 Court Order requires a methane recovery system. This system has yet to be designed or constructed. This system must be designed and constructed in accordance with EPA's Record of Decision (ROD) to meet the requirements of CERCLA. EPA reviewed the existing groundwater monitoring plan. In light of the hydrologic and geologic data collected to date and the fact that there is a potential for a groundwater plume to emerge in the future, a more aggressive groundwater monitoring plan is needed to meet the requirements of CERCLA. Finally, the post-closure monitoring plan must take into consideration EPA's selected remedy and the requirements in EPA's ROD to meet the requirements of CERCLA.

PART 3. POTENTIALLY RESPONSIBLE PARTIES COMMENTS

A. TECHNICAL CONCERNS

Wehran Engineers, Inc. submitted extensive comments on behalf of the owner of L&RR, Inc. These comments and EPA responses to these comments are summarized, by subject area, below.

1. Landfill Gas Emissions and Risk Assessment

a. Comment:

Wehran questions the validity of utilizing so-called "future conditions" (uncovered vents) as the basis for the air exposure and risk assessment. Wehran theorizes that the landfill gases would never be uncontrollably released into the environment because the 1983 Court Order requires a methane recovery system. Therefore, the "future conditions" do not represent any anticipated actual future conditions. The air risk assessment should be based upon current conditions using fugitive emissions data for landfill gases which may be emanating from the Site.

EPA Response:

The risk assessment was based upon emissions from 5 sampled air vents, of the 18 total vents found at the landfill. The best approach to estimate fugitive emissions was thought to be use of actual emissions from some portion of the total vents, rather than introducing additional uncertainties by modeling estimated fugitive emissions. The five vents sampled, which are less than 1/3 of total vents, was considered to present an acceptable estimate of future fugitive emissions due to fissures in the uncovered portion of the landfill.

Although the 1983 Court Order requires a methane recovery and removal system, one has yet to be constructed at the Site. As concluded in the RI/FS, a large volume of gas (775 cubic feet per minute (CFM)) is being generated within the landfill. To protect the integrity of the synthetic cover, the gases generated in the landfill must eventually be released. While it may be true that the vent gases may never be uncontrollably released into the environment, the landfill gases needed to be characterized not only for the purposes of risk assessment but also for design and construction. Ultimately, when the treatment system is designed and constructed, it must protect human health and the environment. Information regarding the degree of hazard associated with the untreated gas is necessary to design a system that is protective. The RI/FS Report and EPA's Proposed Plan clearly states that the vents are currently closed. With the information obtained during the RI/FS, EPA has concluded that these vents should remain closed until a treatment system is constructed.

b. Comment:

The vent velocity measurement technique does not utilize standard methodology or account for any variation across the diameter of the pipe. The vane anemometer method does not provide an accurate flow measurement as per EPA Method 2 and could contain large errors. A more accurate velocity measurement could have been obtained by attaching a larger diameter duct to the vent pipe with access ports to permit traverses and the utilization of a pilot tube and micro manometer system. In addition, the vane anemometer utilized is easily affected by ambient wind conditions and may include a bias. No ambient wind data during sampling is provided in the report. Ultimately, this error results in a reduced risk characterization.

EPA Response:

The vane anemometer employed a shield around the blades to minimize ambient wind influences. The data gathered with the anemometer were used to assess the character of the vent emissions and were not intended to provide a detailed analysis of such emissions. The alternative method recommended by Wehran (EPA Method 2) would have proven highly inaccurate without hydrogen, oxygen and moisture preanalyses of each vent to determine gas density.

c. Comment:

On page 7-12 of the RI/FS Report, reference is made to the six inch pipe diameter stamped on the sides of the vent pipe. Is this ID or OD, and why wasn't an accurate measure taken to confirm the pipe size?

EPA Response:

The pipe size was 6 inches, inner diameter. The stamping was discovered after the initial measurement and only served to confirm the measurement.

d. Comment:

The calculated percent changes in temperature between uncapped and vented scenarios presented in Table 7-3 of the RI/FS Report are incorrect; for example, the reported Vent 2 result is +46.3%. Referring back to Table 7-2, the following calculation results in (1.8 - 7.5)/ 7.5 = -76%. Many of the other reported values are incorrect as well.

EPA Response:

The calculated percent change in temperatures presented in Table 7-3 were calculated using temperature in degrees celsius. For example, in vent 10, a +100% change in temperature was noted for a corresponding temperature increase of 68°F to 104°F. This percent change was actually calculated using celsius values of 20°C and 40°C.

e. Comment:

A footnote on Table 7-6 of the RI/FS Report indicates that vent pipe velocity and temperature measurements were not collected during the VOC sampling events. With the noted variability of the vent flow rates, this is a significant loss of data. No comparison of physical characteristics of the vent emissions can be made between the sampling events and the flow measurement events. With this missing data, actual emission rates at the time of sampling could also have been determined.

EPA Response:

The footnote referenced in the comment was incorrectly written. The footnote should have indicated that velocity data was not available for the 48 hour period of venting. Section 7.4.5 of the RI/FS Report references this loss of data. Exhaust parameter data was available for the remaining VOC sampling events.

f. Comment:

Review of Table 7-7 in the RI/FS Report indicates that the duplicate sample of vent 18 did not replicate the identification of three compounds: 1,1,1 - trichloroethane, trichloroethene, and bromoform. The discussion contained in the RI/FS Report does not accurately represent that 3 of the 11 compounds were not replicated. Potential mis-identification or field sampling error is indicated by these results. Furthermore, if detection limit values are utilized for these non detected results, high relative percent differences are indicated. This error results in reduced risk characterization.

EPA Response:

It is noted that the duplicate samples from vent 18 did not replicate the results for the three compounds noted and field sampling error could have effected these results. However, 1,1,1-trichloroethane was detected in 18 of 21 samples, trichloroethene was detected in 20 of 21 samples and bromoform was detected in 13 of the 21 samples. All of the compounds were detected at significant levels. Of the three compounds, only trichloroethene contributed to the risk. Therefore, this fact is not expected to have influenced the risk.

g. Comment:

On page 7-33 of the RI/FS Report, the worst case scenario for the odor impact is based on the exit parameters from the immediately uncapped scenario. However, no data exists to determine a realistic estimate of the potential duration of this scenario. Velocity or temperature data is presented for the following periods of venting: 0, 12, 24, and 48 hours. On page 7-36, a statement is made that velocity did not stabilize until the 12th hour of venting. Stabilization could have occurred at some time period less than 12 hours. If the vent flows had been more fully investigated, it would have been possible to determine when flows stabilized and subsequently to assess more realistically the duration of this scenario.

EPA Response:

It is agreed that stabilization could have occurred before 12 hours of venting and the report should have indicated this. Since it was not known when stabilization would occur, the intervals of 0, 12, 24 and 48 hours were selected to investigation a range of possibilities. To be conservative and account for the uncertainties of computer modeling and risk assessment, the worst case scenario was based on the results from the immediate uncapped scenario. It is also important to note that the vents are presently closed due to down wind odor problems.

h. Comment:

As discussed on page 7-43 of the RI/FS Report, Wehran questioned the potential impact on the modeling results of the terrain reductions in the receptor elevation input.

EPA Response:

Of the 53 terrain points reduced, 36 were associated with the 100 meter on-site ring with maximum reductions of 13 feet. This ring was only of concern for on-site exposure. The reductions made for off-site receptors numbered 17 and occurred from 600 meters and beyond. The low plume exit characteristics resulted in the worst-case impacts within 600 meters. Furthermore, the 17 off-site receptors with reduced terrain were located east-southeast and south-southwest of the Site, areas that were away from the maximum impact locations. The terrain reductions had little impacts on predicted concentrations.

i. **Comment:**

The VOC averaging scheme discussed on page 7-43 of the RI/FS Report introduces a significant increase in the average VOC concentrations utilized for many of the seventeen compounds. The results reported as non detected (ND) were discarded from the averaging as if the only valid results are those reported above detection limits. For those values reported as ND, the method detection limit value could be utilized for calculating the average. This bias impacts the air dispersion modeling results as well as the risk characterization results, through the over estimation of VOC concentrations in vent pipe emissions.

EPA Response:

Owing to the inherent limitations of any scientific study, any bias towards conservatism is desirable, especially in regards to a public health assessment.

j. **Comment:**

The description of exposure scenarios for inhalation of vent pipe emissions are all based on the uncontrolled venting of the five worst case vents. The qualification addressing "should more vents be uncovered and have emissions similar to these tested" presents a hypothetical situation not likely to occur considering the Site conditions and history. First of all, the Report describes the five worst case vents as orders of magnitude greater (peak areas) than the remaining vents on page 7-25. Therefore, similar emissions are not likely from other vents. Second, there are no current or future plans which incorporate uncontrolled venting of the landfill gases. Although it is used as a worst case scenario for modeling and risk characterization, the discussion of risk should include a statement that the vents are not now or in the future proposed to be allowed to vent to the atmosphere.

EPA Response:

The first point made by Wehran "similar emissions are not likely from other vents" cannot be substantiated. Currently, the emissions from 13 of the 18 vents are less significant than the emissions from the 5 worst case vents. This point does not mean that the emissions from the 13 vents may not pose a health hazard. The sample technique utilized was specifically developed to assess high concentrations. Other techniques could be utilized to detect contaminants in the other 13 vents. Furthermore, while the 13 vents have lower emissions at the present time, there is nothing to indicate that the landfill will continue to emit at its present rate.

As stated in response to comment 1.a. in this section, the RI/FS Report and EPA's Proposed Plan clearly indicates that the vents are presently closed. Given the potential risk to public health from the vent emissions, EPA will insist that they remain closed until a gas treatment system is constructed that meets the objectives of EPA's Record of Decision (ROD).

k. Comment:

The calculation of adult cancer risk is based on exposure over a 70 year lifetime. The landfill gas generation rates and concentrations will not only vary greatly, but the generation lifetime for the landfill is much less that the 70 year exposure period. At a minimum, the flows will be greatly reduced over time. The risk calculation does not account for the major reduction in landfill gas emissions, which will naturally occur over the lifetime of the landfill.

EPA Response:

While it is agreed that gas emissions will decrease over the life span of a landfill, there is no information to indicate with any degree of certainty what reductions will occur over what time period. Therefore, emissions were assumed to continue over a full human lifetime. It should be noted however, that for the most probable case, it was assumed that exposure would only occur 75% of the time.

l. Comment:

The risk assessment states that there are no residences at the off-site point of maximum impact. If not, why was this location used in the risk assessment? Is this an expected future condition? If so, this should be stated in the risk assessment.

EPA Response:

Risks were calculated assuming exposure at the off-site point of maximum impact to present a worst case scenario. In addition, risks were calculated assuming exposure at 3 residential locations to present a most probable case.

m. Comment:

The predicted concentrations at the on-site maximum impact point remain constant for at least the period of exposure (9 years). There is no basis for this assumption provided in the RI/FS Report. It is probable that if the landfill vents were opened, emissions could decrease with time.

EPA Response:

As stated previously, there are no quantitative data on the decrease in gas generation rates or concentrations over the life span of a landfill. Therefore, it was assumed that fugitive emissions would remain constant. It should be noted that the concentrations at the on-site maximum impact point is an annual average value and that although higher concentrations would occur due to metrological conditions, the annual average is the most realistic value.

n. Comment:

The realistic worst case analysis is based on the assumption that children will visit the on-site maximum impact point twice a month for nine years and remain at that location for four hours each time. There is no evidence to support any of these assumptions. Furthermore, if a fence with barbed wire is installed around the Site, there is no probability of this circumstance happening at any time in the future.

EPA Response:

There is physical evidence that the Site has been accessed by individuals. This includes dirt bike tracks and trash. The ventilation rate is consistent with a moderate activity level, which is considered appropriate for children at play. These assumptions apply to the Site as it exists now, which are considered baseline conditions that would not require long-term management and oversight, including site security such as a fence.

o. Comment:

Source terms for air quality modeling are suspect and yet greatly impact the health risk assessment. Specifically, selection of source emission properties based on measurements taken before the source has reached equilibrium may not provide an accurate estimate. Second, failure of the velometer prevents proposing the assumption that the emissions have stabilized. Finally, vent velocities may not be accurately assessed without barometric pressures measurements.

EPA Response:

Vent gas exit velocities averaged 2.5 miles per hour after 12 hours of venting and continued at this rate at 24 hour point. The value represented a drop from the immediately uncapped value of 5.1 mph. Since the drop continued after 12 hours, flow equilibrium was reached within the period of sampling.

Although it has been suggested that atmospheric (barometric) pressure affects landfill gas emissions, it is not expected to be significant in this case. For a landfill the size of L&RR, the primary source of emissions is the methane generated, which is a function of material decay and decomposition. Atmospheric pressure will not direct the rate of decay nor will atmospheric pressure significantly alter an emission volume of 775 cubic feet per minute.

It is doubtful that the source terms will remain constant for 70 years, nor was it ever stated in the RI/FS Report. The uncertainty associated with this change is the reason why worst case assumptions were used in completing the risk assessment.

p. Comment:

There is no validation of the quantitative emissions concentrations derived from field GC studies. A large part of the risk assessment from the air exposure is due to two compounds: 1,2, dichloroethane and carbon tetrachloride. GC/MS samples failed to confirm the presence of these compounds.

EPA Response:

Observed differences between the field GC sampling results and the laboratory analyzed tenax and charcoal tubes may be due to a variety of factors. Quantification of the charcoal and tenax tubes was hampered by breakthrough and probable loss of certain hazardous substance list (HSL) compounds of concern due to displacement from the tubes by high concentrations of other HSL and/or non-HSL organics. Initial CLP laboratory analyses confirmed the existence of high organic loadings on certain tubes. In addition, during sorbent tube sample collection, water vapor condensation was a recurring problem. The presence of water can adversely affect sorbent tube performance. The field gas analyzed samples were collected in gas bulbs which were not subject to breakthrough or desorption losses as are sorbent tubes.

Sample analyses using the field GC based all comparisons of peaks to volatile standards containing the targeted compounds, with a standard analyzed at the start of the day and every eight hours until the analysis day was complete. Retention times (RTS) were matched based upon the observed drift of the RTS in the samples and by generating relative retention times (RRTS) to a late eluting compound (toluene). Therefore, the identifications are considered valid.

As discussed in the RI, the sorbent tube data confirm the field GC results indicating the presence of a wide variety of chlorinated and non-chlorinated organic compounds in the vent emissions. Both the charcoal and tenax tube data for samples from several vent locations indicate the presence of many HSL organics in both the front and back tube portions indicating the occurrence of breakthrough.

With respect to field GC data, it should be noted that carbon tetrachloride was detected in four different samples from each of five different vent locations and 1,2-dichloroethane was detected in multiple samples from two different vent locations.

From the health perspective, the realistic worst case estimate of health risks (1.1×10^{-3}) to children due to the inhalation of air contamination from vents exceeded the EPA target range for risk of 1×10^{-4} by approximately an order of magnitude. This total risk was due to significant contributions from several air contaminants including chloroform and tetrachloroethene/ 1,1,2,2-tetrachloroethane, in addition to 1,2-dichlroethane and carbon tetrachloride. The calculated risk due to any one of the constituents considered individually approached or exceeded the EPA target level of 1×10^{-4}.

In addition, for this scenario the total calculated risks from several other structurally similar chlorinated organics (methylene chloride, 1,1-dichloroethene, and trichloroethene) and benzene , all of which were detected, were within a factor of three of the 10^{-4} upper bound target risk.

In summary, the air sampling results indicate the presence of a wide variety of organic constituents in the vent emissions.

q. Comment:

The screening of gas treatment technologies in the FS was not conducted correctly. To determine the reduction in health risks achieved by each gas treatment technology, the ambient concentrations produced by the five vent sources was reduced by the destruction and removal efficiencies of each technology. After treatment, there will be one source, the stack. Ambient concentrations from one source will be significantly less.

EPA Response:

It was acknowledged in the RI/FS Report that the selected technology will change source emission parameters. However, the intent of the investigation was to characterize the source contaminant term and the exhaust parameters. Although the exhaust parameters will change, the overall contaminant feed rate and quantity will not differ because of the selected technology. Knowledge of these terms will allow a proper control technique to be sized and implemented.

r. Comment:

Some design efficiencies and cost estimates have not been adequately assessed, particularly in regards to the gas treatment technologies.

EPA Response:

The cost analysis in the FS is primarily conducted to provide EPA with an estimated comparative cost for each alternative. These estimates are made with a number of assumptions and the actual costs may vary between -30 and +50 percent. The detailed cost information is developed during the design phase.

2. **Landfill Performance Model**

a. Comment:

The amount of leachate generated from the uncapped area of the Site was determined by use of the HELP model. The results of this hydrologic modeling are presented in Table 9-1 and 9-2 of the RI/FS Report. Based on a leachate generation rate of 59% of the total incident precipitation in uncapped areas, as compared with 0.7% for capped areas, capping of this area was determined by the RI/FS as beneficial. However, upon inspection of Tables 9-1 and 9-2, it is apparent that the modeling results are significantly in error. Wehran Engineering has calculated the water balance for the L&RR landfill using a method developed by C.W. Thornthwaite, as applied to solid waste disposal sites by D.G. Fenn, et.al. The results of the water balance for the uncapped landfill areas show a percolation rate of 6.8 inches per year. This rate is 15% of the average annual 46.2 inches of incident precipitation, rather than the 59% as calculated by the HELP model. Therefore, the RI/FS assumption is approximately 400% off.

EPA Response:

Both of the methods utilized, the HELP model and the Thornthwaite method as modified by Fenn, use analytical methods to evaluate infiltration. However, both are controlled by assumptions and input parameters and both result in approximations. Wehran did not submit their input assumptions with their comment or at the request of EPA. Therefore, EPA could not evaluate the validity of Wehran's results. In response to this comment, EC Jordan utilized the Thornthwaite water balance method as modified by Fenn with a set of input assumptions which were similar to the ones utilized for the HELP model and acceptable to EPA. This approach resulted in an infiltration of 16 inches/yr (See Memo in Administrative Record from EBASCO dated September 26, 1988).

In 1983, Wehran performed a water balance for the uncovered area of the landfill using the method of Thornthwaite as modified by Fenn and calculated an infiltration of 19.3 in/yr. Using this same method in their comments on EPA's RI/FS, Wehran calculated 6.8 in/yr. These results demonstrate the variation that can occurr in approximating infiltration with different input parameters and assumptions.

Using the HELP Model in the RI/FS, EC Jordan calculated infiltration as 27.64 in/yr. The HELP model represents the most conservative approach to calculating infiltration, particularly on the uncovered area.

Based on a review of EC Jordan's assumptions and results, EPA finds that the infiltration could realistically be in the range between 6.8 in/yr and 19.3 in/yr or rather 185,000 gallons/acre/yr and 524,000 gallons/acre/yr, respectively. The maximum infiltration calculated for the rest of the landfill, which has a synthetic cover as part of the cover system, was estimated to be 7,690 gal/acre/yr. Given the uncertainties associated with landfilling of wastes and the lack of information regarding the location of the wastes, the type and amount of wastes disposed and the hydrologic flow in the landfill, EPA finds this range of infiltration in the uncovered area unacceptable. To meet the objectives of CERCLA, to protect human health and the environment and meet ARARs, a synthetic cover is needed in this uncovered area.

b. Comment:

The specific version of the HELP model used was not documented. However, in all versions Wehran has reviewed, the model is not meant for landfill slopes greater than 10% In the RI/FS Report, the model was used on slopes of 33% and 50%. One effect of using these slope factors in the model is an inability to accurately predict average runoff conditions. It is widely recognized in hydrologic calculations that when the slope of the land is steepened, the fraction of rainfall which becomes runoff increases. In Table 9-2, for existing conditions, the percentage of runoff at a 3% slope was calculated by the model at 21.37% of the total annual precipitation. At a 33% slope, rather than the runoff fraction increasing, the fraction decreased to 0.62% of the total annual precipitation. The soil structure data was identical for both slopes, as shown in Table 9-1. When no cap barrier was included in the model design at 50% slopes, the rainfall fraction, which was previously removed from the model system by the barrier drainage layer at 33%, was now percolated vertically into the landfill. In fact, a substantial amount of this percolation (and the barrier layer drainage at 33%) should have been calculated as runoff.

EPA Response:

EPA agrees that the HELP model is limited in its ability to accurately represent slopes greater than 10% and it was utilized as a conservative approach to the Site. The Thornthwaite method as modified by Fenn is probably a more appropriate method for representing the infiltration at the L&RR Site. However, the Thornthwaite method as modified by Fenn is also strongly influenced by the assumed runoff coefficient. Therefore, the estimates can be very subjective since the user projects their "best" estimate as to what the percent precipitation is actually running off. EPA finds that the infiltration in the uncovered area could realistically be in the range between 6.8 and 19.3 in/yr. Given the uncertainties associated with the Site as discussed above, EPA finds this range of infiltration unacceptable. EPA believes that in order to meet the objectives of CERCLA, to protect human health and the environment and meet ARARs, a synthetic cover is needed in this uncovered area.

3. Applicable or Relevant and Appropriate Requirements (ARARs)

a. Comment:

Given the fact that the HELP model results contained an error regarding infiltration calculations and that runoff rates in the non-capped area were not adequately considered, the conclusion that the final cover does not achieve applicable or relevant and appropriate requirements (ARARs) is not adequately justified within the RI/FS Report.

EPA Response:

As discussed in previous responses, EPA believes that the infiltration in the uncovered area most probably falls between the range of 6.8 in/yr to 19.3 in/yr. However, without site-specific tests, the infiltration could not be exactly determined. In light of the uncertainties associated with landfilling wastes and the lack of information regarding the location of the hazardous wastes, the types and quantities of wastes, and the hydrologic flow in the landfill, EPA finds this range of infiltration unacceptable for meeting the ARARs and in particular the requirements of RCRA Subtitle C regulations which require the landfill cover to minimize infiltration and migration of liquids through the landfill.

b. Comment:

On page 2-7, the FS Report states that "although not directly applicable" and "generally RCRA regulations have jurisdiction at hazardous waste facilities that accepted

RCRA-listed wastes after November 19, 1980; L&RR ceased accepting hazardous waste in September 1979". However, EPA proceeded to evaluate these RCRA regulations as if they were relevant and appropriate requirements and then recommended implementation of remedial alternatives on the basis of these regulations that are "not directly applicable". The basis for landfill ARARs at this Site should be the 1983 Court Order executed between L&RR and RIDEM.

EPA Response:

Section 121 of CERCLA requires EPA's selected remedy to attain applicable or relevant and appropriate requirements. For the L&RR Site, RCRA Subtitle C is not applicable because the Site accepted hazardous waste prior to November 19, 1980. However, the RCRA Subtitle C regulations are relevant and appropriate because the Site contains wastes that are similar or identical to RCRA hazardous wastes and hazardous constituents and the CERCLA action involves long-term landfilling disposal. Furthermore, these regulations address problems or situations sufficiently similar to those encountered at the L&RR Site and their use is well suited to the Site. Relevant and appropriate requirements must be complied with to the same degree as if it were applicable. Under the terms of Section 121, the 1983 Court Order is not a requirement of general applicability which would govern a CERCLA remedy.

c. Comment:

Wehran asked whether current air concentrations meet the ARARs. Wehran stated that the Air Toxic regulations are not clearly presented. Wehran asked whether these are emission standards as referred to in Table 11-9 or ambient levels as referred to on page 11-17. In either case, why aren't they provided in Table 11-16, and how do the current landfill conditions compare to them? There is some indication of a standard/guideline on Table 11-2, but it appears this refers to the Risk Reference Dose (RfD).

EPA Response:

The Rhode Island Air Pollution Control Regulation No. 22, "Air Toxics" present acceptable ambient levels. However, minimum quantities of emissions, above which a generator must report, are also stated. The Air Toxics regulations are presented and discussed in Appendix Y of the RI/FS Report. In addition, a discussion is presented in a Technical Memorandum from EC Jordan dated July 15, 1988 and included in the Administrative Record. The existing landfill vent emissions do not presently meet these regulations. Since fugitive emissions were not quantitatively characterized, it could not be determined if the fugitive emissions meet these regulations.

4. EPA's Proposed Plan

a. Comment:

Steep side slopes, up to 50%, can be readily stabilized with proper drainage controls and suitable vegetative cover. Should a particular area show to be more susceptible to erosion, the topsoil can be strengthened with a synthetic mesh material. The key to proper vegetation establishment is prompt re-dressing of any areas showing signs of erosion and continual maintenance until a sturdy rootmat has been established. Wehran feels that such an approach would alleviate the need for any flattening of the existing slope.

EPA Response:

Based on observations made during the RI, the existing vegetative cover is considered to be in "poor" condition on the steep side slope areas. The existing root mat is thin and plant density is low. Sandy, well-drained soils such as those of the existing topsoil typically have difficulty in establishing the good to excellent vegetative cover necessary to stabilize those types of soils on steep grades. Excessive soil loss, which has historically been a problem at the Site, can be temporarily lessened with synthetic mesh materials, however, long-term minimization of soil erosion without continued maintenance depends on vegetative establishment which the existing soil on the steep side slopes has not supported.

Flattening the steep slopes would reduce the potential for excessive soil erosion and provide an opportunity for the establishment of a higher quality vegetative cover.

b. Comment:

The conclusions of the RI/FS indicate that "an organic plume is not migrating from the Site" and that "the L&RR Site is not presently impacting the local private wells". This, along with the incorrect results from the HELP model, do not justify the need for capping the existing uncapped side slopes on the northeastern side of the landfill. Wehran believe that these areas should be revegetated after the methane gas extraction system comes on-line. In the interim, the side slopes should be reseeded where needed to prevent erosion.

EPA Response:

As discussed in detail in response to comment A.5. in Part 2, there are a number of reasons for upgrading the present landfill closure and more specifically installing a synthetic cover on the northeast portion of the landfill. Although the groundwater monitoring results indicate that a plume of hazardous contaminants is not presently migrating from the Site, historical information indicates that a plume could emerge in the future. Furthermore, EPA must select a remedy that protects groundwater. The infiltration in the uncovered area has been estimated to be 27.64 inches per year, as calculated in the RI/FS Report using the HELP model, 19.3 inches/yr, as calculated by Wehran in their 1983 closure plans using the Thornthwaite method as modified by Fenn, 16 inches/yr, as calcualted by EC Jordan using the same method, and 6.8 inches/yr, as calculated once again using this method by Wehran in their 1988 comments. EPA believes that the actual infiltration realistically falls within the range between 6.8 in/yr and 19.3 in/yr. The covered portion of the landfill reduces infiltration to approximately 0.3 inches/yr. It is clear that a synthetic cap on the uncovered portion of the landfill will minimize infiltration and the migration of liquids through the landfill to the lowest practical extent and protect groundwater.

c. Comment:

The first component of EPA's Proposed Plan is upgrading the existing landfill closure to conform with either Alternative 3 or Alternative 4 of the RI/FS Report. Wehran's position is that the final cover plan proposed in the Court Order and Consent Order and Agreement, dated July 13, 1983 (the 1983 Court Order), is appropriate and adequate for the L&RR Site.

EPA Response:

The closure plans established by Wehran for the 1983 Court Order are not appropriate or adequate because they do not meet the requirements of CERCLA. In order to meet the requirements of CERCLA, the landfill closure must protect human health and the environment.

It is evident from observing the impacts to the wetlands that the existing closure is not protecting the environment. The existing surface water runoff management system, slopes and vegetation are not minimizing erosion and the eroded soil is filling in the wetlands. The selected remedy will upgrade the existing surface water management system, stabilize the slopes and establish vegetation to minimize erosion. Furthermore, the impacted wetlands will be remediated and re-vegetated.

By not minimizing infiltration, the existing closure is not protecting the groundwater. Considering the lack of definitive information regarding the location, types and amounts of hazardous wastes and the hydrologic flow within the landfill, the synthetic cover in the northeast area is necessary to protect the groundwater aquifer which is designated as a potential future drinking water source.

d. Comment:

The second component of EPA's Proposed Plan is installing a gas collection and thermal destruction system. The gas management program established by the 1983 Court Order will provide the required benefits of controlling landfill gas emissions.

EPA Response:

EPA has proposed three technical approaches that will reduce gaseous emissions to levels that will eliminate the estimated risk and be protective of public health. As stated in the Proposed Plan, the effectiveness of the gas treatment technologies proposed will have to be determined by pilot testing programs of individual systems during the design phase. The effectiveness of individual systems will be judged by actual data generated during the pilot programs. A methane recovery and removal system required by the 1983 Court Order will have to demonstrate, prior to construction, the capability to reduce emissions to levels that are protective of public health and the environment.

e. Comment:

The third component of EPA's Proposed Plan requires regular monitoring of the groundwater, surface water, and air. Wehran Engineering supports a monitoring program as included per the 1983 Court Order.

EPA Response:

The 1983 Court Order contains plans for monitoring the groundwater and surface water. After consideration of the comments made on the Proposed Plan, EPA established a groundwater monitoring plan in the Record of Decision (ROD) which is different than the ones discussed in the RI/FS Report. In establishing the monitoring plan, EPA considered the monitoring plan presented by Wehran as well as all of the hydrologic and geologic data collected to date. The groundwater monitoring plan established in the ROD is necessary to meet the requirements of CERCLA. This plan takes into consideration the fact that EPA is not selecting a permanent remedy, the uncertainties associated with landfilling of wastes and the fact that the landfill is situated over the Slatersville Reservoir which is a future potential drinking water source. It is also important to note that the 1983 Court Order does not contain plans for air monitoring. This monitoring is also needed to meet the requirements of CERCLA to insure that the gas treatment system is protecting human health and the environment.

f. Comment:

In as much as the preferred alternative is aimed at reducing the impacts of contaminants in the groundwater, General Dynamics does not understand how the alternative can be evaluated relative to reducing health impacts.

EPA Response:

As discussed in response to comment A.5. in Part 2, although a plume of hazardous contaminants is presently not migrating from the Site, there is a potential for one to emerge in the future. The selected remedy is designed to protect public health and the environment from the threat posed by future releases. Presently, a potential risk to public health and the environment is not posed from ingesting the groundwater. However, the landfill is located over the Slatersville Aquifer which is designated as future drinking water source. The selected remedy is designed to prevent a release to the groundwater while at the same time monitoring to insure that any threat from a release will not impact the intended use of the aquifer.

5. **Wetlands**

a. Comment:

The first paragraph on page 10-25 of the RI/FS Report states that "the most severe environmental effects from the L&RR Site are due to erosion of landfill soils and subsequent sedimentation in the wetland floodplain". Wehran contends that this conclusion is not a CERCLA issue.

EPA Response:

Section 104(a)(1) of CERCLA states that "Whenever (A) any hazardous substance is released or there is a substantial threat of such a release into the environment, or (B) there is a release or substantial threat of release into the environment of any pollutant or contaminant which may present an imminent and substantial danger to the public health or welfare, the President is authorized to act, consistent with the national contingency plan, to remove or arrange for the removal of, and provide for remedial action relating to such hazardous substance, pollutant or contaminant at any time, or take any other response measure necessary to protect the public health or welfare or the environment."

There are substantial threats of releases of hazardous substances at the L&RR Site. The sand cover was installed to prevent releases of hazardous substances. The correction of the erosion from the sand cover at the Site, including the restoration of the wetlands affected by that erosion, is a response action necessary to protect public health, or welfare and the environment. Section 101 of CERCLA defines "response" to include "removal", and defines the latter to include "such other actions as may be necessary to prevent, minimize or mitigate damage to public health, welfare or the environment which may result from the release or threat of a release."

Section 101 states that the term "pollutant or contaminant" includes "any element, substance, compound, or mixture," which, "after release into the environment and upon exposure, ingestion, inhalation or assimilation into any organism, will or may reasonable be anticipated to cause death,." At the L&RR Site, the sand eroding from the landfill cover is a substance that is causing death to organisms in the wetlands. Furthermore, this sand is preventing the reestablishment of the wetlands. The sand needs to be remediated and future impacts need to be prevented. CERCLA gives EPA the authority to remediate this substance from the wetlands and prevent future impacts.

b. Comment:

The third paragraph on page 10-25 states "that continued erosion is expected to prevent recolonization by wetland plant species". Wehran notes that during the Site visit conducted on August 5, 1988, recolonization by wetland plant species was, in fact, observed in many locations impacted by sedimentation.

EPA Response:

Recolonization of some sections of the wetland plant species was observed on August 5, 1988, indicating sediment loading rates were lower than expected in some areas. However, in other areas, die off of alders which had been alive during wetland investigation was observed, including that impacts to the wetland are continuing to occur. Additionally, the wetland continues to have a low value in terms of aquatic habitat and other functional attributes.

c. Comment:

Extrapolation of effects from acute toxicity tests performed in many different laboratories to field situations is an inappropriate practice. The hypothesis that an impact on the system exists based on chemical analysis of samples from the wetland media is suspect. Furthermore, hardness data was not collected to adequately assess the aquatic water quality criteria.

EPA Response:

Extrapolation of laboratory test data to predict impacts in the field is a widely utilized EPA approved practice, in lieu of field test data. In addition, the toxicity data reported were from tests reviewed by EPA according to stringent protocol and deemed valid; they are listed in the EPA Water Quality Criteria Document for each chemical.

Hardness of the water was not measured during the environmental sampling; however, EC Jordan contacted RIDEM, who said that 50 mg/l is a typical hardness value for surface waters in Rhode Island and should be used to calculate protective criteria in the absence of site-specific hardness data.

d. Comment:

The effectiveness of the remedial alternatives at reducing the environmental impacts to the wetlands cannot be assessed because no objective system of quantifying damage is available. Remediation may cause more damage to the wetlands.

EPA Response:

The sampling survey was qualitative in that no calculation of diversity indexes or population densities were made. However, it was clear from the species of invertebrates identified and the numbers of individuals collected that markedly lower population densities and fewer taxa existed in areas containing large quantities of erosional sediment compared with relatively unaffected areas. Although low levels of toxicants were detected in the wetlands, the deposition of erosional sediment has greatly reduced the value of the wetland in terms of aquatic habitat and other functional attributes. Therefore, remediation is warranted and will not result in significantly greater damage than has already occurred.

The magnitude and degree of damage to the wetlands is adequately described and the areas that require remediation are clearly delineated in the RI/FS Report. Further details will be gathered during the design phase of remediation and erosion management will be completed prior to proceeding with wetland remediation.

6. Remedial Alternatives Analyzed

a. Comment:

Wehran concurred with the results of the RI/FS Report that gas evacuation with some type of combustion system is worthwhile for the L&RR Site. However, gas evacuation systems have performed well in non-capped sites. Individual gas wells can be adjusted for optimal vacuum pressures, thus, assuring that air intrusion is not a significant factor in the combustion process. Should a minor amount of air penetrate through the cover soils and be collected within the system, a possible soil and waste drying effect would result and further reduce potential leachate generation. Therefore, Wehran does not feel the argument favoring a synthetic cover, based on the grounds of air intrusion, has any merit and requests further consideration of Alternative 2 and an active gas collection system.

EPA Response:

Although gas extraction systems can be operated on sites without synthetic covers, to obtain the best operating conditions the gas extraction system should be operated in conjunction with a synthetic cover in the northeast area. An uncovered landfill affords the opportunity for air to enter the landfill and dilute the landfill gas. The concern is not only that there would be dilution, but also that the dilution would be uncontrolled. This situation would reduce the quantity of combustible methane gas being drawn, reduce the quality of the gas to be burned, and introduce a greater variability into the landfill gas composition. In turn, the efficiency production would be reduced.

Landfill gas is generally combined with 4 to 6.5 volumes of air per volume of gas to obtain a proper burning mixture. With the current cover system, an unknown quantity of air would be drawn into the landfill. It would be difficult to control the air to gas ratio required for proper operation without supplemental fuel and continuous monitoring of system performance.

Gas treatment is required due to the presence of hazardous constituents in the landfill gas. Installation of the liner would increase the probability of attaining the destruction and removal efficiencies expected with the systems.

Additionally, the primary reason for installing the synthetic cover in the northeast area of the Site was to protect the groundwater. Alternative 2 does not include a synthetic cover and therefore does not provide the necessary groundwater protection.

b. Comment:

There were no investigations in the landfill. Since geophysical surveys were not conducted within the limits of the landfill, the contaminant source has not been adequately characterized. Without this information, the effectiveness of the alternatives at minimizing infiltration can not be properly assessed.

EPA Response:

EPA's RI/FS for the L&RR Site was conducted using a phased approach. At the conclusion of the first phase, EPA discovered that a plume of hazardous contaminants was not migrating from the Site. Therefore, EPA did not believe it was necessary to conduct investigations within the landfill and disrupt the existing landfill cover which may be protecting the groundwater. Instead, EPA believes that it is more effective to implement a groundwater monitoring program to assess the performance of the Site.

7. Site History

a. Comment:

The information presented on page 1-9 and ES-2 of the RI/FS Report is incorrect. In 1985, Wehran prepared a Remedial Investigation Summary Report. This was not a separate investigation but a summary report utilizing data from numerous engineering investigations and reports for the L&RR Site. The purpose of this report was to identify to EPA that an adequate amount of investigative data was available to initiate remedial activities in conformance with the Court Order between L&RR and the RIDEM. Wehran was never advised that this report was evaluated by EPA's contractor (GCA Corporation) or that there were data gaps or deficiencies noted during this evaluation, nor was Wehran given any opportunity to correct any alleged deficiencies.

EPA Response:

EPA acknowledges Wehran's comment and adds the following clarifying points. Between June of 1983 and January of 1985, EPA conducted numerous negotiations with L&RR, Inc., to conduct an RI/FS. An agreement was not reached and EPA withdrew from the process of negotiations on January 29, 1985, intending to conduct an RI/FS using federal funds. The owner proceeded to close the landfill in January of 1985 according to the 1983 Court Order and plans developed by Wehran. During 1985 and 1986, GCA under contract to EPA, observed the Site closure operations and evaluated its compliance with RCRA Subtitle C regulations. The information obtained by GCA was intended to supplement information obtained during EPA's RI/FS. EPA notified L&RR, Inc., of deficiencies in the closure operations in a number of written correspondence throughout the closure operations.

8. Groundwater and Geophysical Investigations

a. Comment:

The number, location and design of the wells is insufficient for characterizing current or future impacts of contaminants on groundwater.

EPA Response:

A number of factors must be considered when establishing a network of groundwater monitoring wells at a site. Presently there are 14 groundwater monitoring wells installed around the perimeter of the Site. Nine of these wells were installed by the present Site owner. After reviewing hydrologic and geologic information for the Site, EPA installed five additional monitoring wells during the RI/FS to gather information to characterize contamination at the Site. The long-term groundwater monitoring plan outlined in the Record of Decision requires a new cluster of wells. This cluster will have two wells and will be located between monitoring well clusters CW-6 and CW-7. The specific location of this cluster will be decided during the design phase. Given the geologic conditions at the Site, this monitoring well network will identify a contaminant groundwater plume migrating from the Site. Given that above background concentrations of inorganic substances and other parameters in the groundwater have been detected down gradient from the Site, this suggests that these wells are properly located to also intersect organic contamination.

b. Comment:

The geophysical investigation was extremely limited since only six stations were vertically sounded. Furthermore, the zones of high conductivity were interpreted to be due to possible leachate. However, the high conductivity could be due to the power lines, buried drums or other metal objects within the landfill.

No explanation was given for the inability to interpret vertical resistivity soundings B, E and F.

EPA Response:

The data from vertical electrical resistivity soundings was very limited as noted and the data was not used in a quantitative sense for the construction of geologic profiles.

During the RI, the proximity of the power lines was not expected to substantially affect the results. Data that was expected to be the result of or affected by buried drums and debris was indicated as such in the results.

No solutions are presented for vertical soundings B, E and F because the data quality was not sufficient to provide reliable solutions. There was "scatter" present in all three of these data sets, perhaps due to lateral variation in stratigraphy/moisture conditions.

c. Comment:

Bedrock interpretations in the RI were base on five test borings and geophysical data. The spacial distribution is not adequate for accurate bedrock elevation interpretation.

EPA Response:

It is correct that fewer hydrogeologic data were obtained from the bedrock flow system. In an attempt to further our understanding of the bedrock flow regime, a water balance was conducted to determine the flow into or out of the bedrock aquifer. Exploration of the bedrock would have been conducted during a latter phase of study if significant overburden contamination was encountered in the first phase.

d. Comment:

Fate and Transport of the groundwater is not adequately characterized. It is likely that the ice contact deposits form the primary pathway for migration of contaminants from the landfill to off-site areas since the permeability of this unit is estimated to be more than the kame delta deposits.

EPA Response:

A specific figure for indicating groundwater flow in the ice contact deposits was not developed for several reasons. First, the ice contact deposits do not appear to be aerially extensive and seemed to occur as a lense. Second, where they were encountered, the potentiometric surface was very similar to the overlying kame delta deposits.

9. Miscellaneous

a. Comment:

Tables 11-1 and 11-2 are not provided in the RI/FS Report and, as such, Wehran is unable to provide comment. Wehran requests that these tables be made available for review and comment.

EPA Response:

These tables were present in the original RI/FS document. A copy of the original document was submitted to L&RR, Inc. Wehran could have requested a copy of these tables from the original document from either EPA or L&RR, Inc., during the comment period. Additionally, a complete copy of these documents were available for public review in two repositories as indicated in EPA's Proposed Plan.

b. Comment:

None of the data from the previous reports were used in the RI/FS completed by EC Jordan.

EPA Response:

The L&RR Site has been the focus of several investigations. The information and data developed in these prior studies and investigations has been considered, and where appropriate, has been used in the evaluations for the L&RR RI/FS. Most of this data could only be used qualitatively because quality assurance/quality control information was not available for the data.

B. LEGAL CONCERNS REGARDING EPA INVESTIGATIONS AND THE PROPOSED PLAN

1. Site History

a. Comment:

The company that conducted the RI/FS, namely E.C. Jordan Company, used to be known as Perkins Jordan, Inc. The RI/FS Report fails to mention that the consultant which was advising the State of Rhode Island in matters regarding the L&RR Site leading up to the Consent Order and Agreement was none other than this identical firm, at the time called Perkins Jordan. Consequently, the credibility of the current recommendation by this firm to spend five to six million dollars on the slopes is undermined by the fact that in 1983 this same firm studied this Site and did not make this recommendation.

EPA Response:

It is correct that in 1983, Jordan Co. personnel working as part of Perkins Jordan, Inc., served as consultants to the RIDEM. Jordan's role at this time was to provide expert testimony on the potential for the L&RR landfill to impact domestic wells in the area. Jordan personnel reviewed available data provided by RIDEM and indicated that, in their professional judgement, the potential for impact to wells existed. However, during that study no samples were collected or analyzed and no engineering evaluations were made regarding landfill design closure.

b. Comment:

Nowhere in the RI/FS Report is there any mention that in 1983 the RIDEM and L&RR, Inc., entered into a Consent Order and Agreement setting forth how to close the Site in an "environmentally sound manner". Furthermore, at a contested hearing on July 13, 1983, the Superior Court of the State of Rhode Island approved that Consent Order and Agreement, entered it as a Court Order, and retained jurisdiction over the Site. The 1983 Court Order approved and instituted stringent plans for: final operation, closure, capping, methane recovery and removal, post-closure monitoring, setting aside money for long-term monitoring, stabilization of slopes, vegetating slopes, and litter and dust control. The plans for these were explicitly incorporated as part of the Court Order.

EPA Response:

The purpose of this RI/FS Report was not to give a detailed explanation of the history of the litigation between RIDEM and L&RR, Inc. EPA is aware of the 1983 Court Order. However, EPA was not a party to the State Court proceedings and is not bound by its terms and conditions. The Administrative Record contains extensive documentation regarding the history of the Site as well as a copy of the 1983 Court Order. All of this information was reviewed by EC Jordan prior to conducting the RI/FS.

c. Comment:

The RI/FS fails to mention that before the RIDEM agreed to enter into the Agreement on June 29, 1983, the RIDEM sent all these plans and proposals to the EPA for review. These plans explicitly dealt with slopes and covers as well as the extent of infiltration and steps to minimize it. After intensive review by EPA and meetings between and among the EPA, the RIDEM, and L&RR on June 20, 1983 and June 26, 1983, the EPA gave the RIDEM its OK to enter into the Consent Order and Agreement (the 1983 Court Order). In reliance on that, on June 29, 1983, the RIDEM proceeded to sign the Consent Order and Agreement.

Along those lines, the RI/FS Report also fails to mention that the EPA reviewed the 1983 Court Order as a remedial action and as a RI/FS back in 1983. The EPA analyzed the 1983 Court Order from that point of view and made comments. Those comments are set forth in an EPA letter dated July 26, 1983. Consequently, the credibility of this report's recommendations is eroded by the fact that the report fails to mention that the EPA in 1983 reviewed the 1983 submission both as a remedial action and as an RI/FS and did not find fault with those parts which the current report finds fault with.

EPA Response:

EPA did not approve the 1983 Court Order between L&RR, Inc., and RIDEM, either as a fulfillment of the requirements of the National Contingency Plan (NCP), 40 CFR Part 300, or in any other sense. EPA's July 26, 1983 letter to David Wilson explicitly states that RIDEM had recommended the settlement to EPA, as they were required to do by the terms of the Court Order, but the letter does not say that EPA had accepted the RIDEM's recommendation. In fact, EPA's letter recommended substituting a different groundwater monitoring plan and specifically queried whether remedial action had been considered to prevent off-site groundwater contamination. The record shows that after reviewing the July 26, 1988 letter, L&RR, Inc., with its consultants, Wehran Engineering, met with EPA and discussed additional work to be covered by an administrative consent order to be issued by EPA on consent to L&RR, Inc.

The record shows that in subsequent months, EPA attempted to negotiate with L&RR, Inc., for the performance of a Remedial Investigation/Feasibility Study which would satisfy federal requirements. The record shows that EPA considered the available information on the Site insufficient for EPA to approve L&RR's closure plans. Specifically, EPA wanted further investigation of the bedrock aquifer, the potential for off-site groundwater contamination, the extent of off-site contamination, if any, the extent of impacts on off-site surface water and wetlands and the effect of the risk posed by air releases.

In a letter dated December 13, 1984, David Wilson of L&RR, Inc., informed EPA that L&RR, Inc., would not sign EPA's proposed consent order. Mr. Wilson proposed to submit new information to EPA in an effort to convince the Agency that the order was unnecessary. EPA replied in a letter dated January 29, 1985, stating that EPA was withdrawing from negotiations with L&RR, Inc., and clearly stating that EPA was reserving the right to take further actions, either on its own or through its enforcement powers to obtain a complete RI/FS. EPA indicated its willingness, on the basis of a satisfactory RI/FS, to consider whether closure under the Court Order would be sufficient to allow delisting of the Site from the National Priorities Lists (NPL). In the same letter, EPA detailed the history of its communications with L&RR, Inc. EPA emphasized that it did not agree with L&RR's position that EPA's July 26, 1983 letter constituted an "approval" of the 1983 Court Order. EPA stated that it had never found that the closure satisfied EPA's requirements, and indicated that only compliance with the landfill closure standards of RCRA would satisfy EPA's policy (That policy has since been made statutory in SARA).

EPA wrote to L&RR, Inc., on May 13, 1985, re-iterating that EPA was not a party to the Court Order. The letter offered comments, emphasizing that the comments were not offered as conditions for EPA approval of L&RR's work which EPA would not give outside of an enforceable consent order with EPA. EPA's comments specified that the closure did not appear to satisfy the requirements of 40 CFR Subparts F,G and N. EPA specifically indicated that the proposed cover appeared unlikely to provide long-term minimization of infiltration. Subsequently, in letters dated June 7, August 13, and October 10, 1985, EPA commented on certain aspects of L&RR activities, while re-establishing that EPA was not prepared to give L&RR formal approval of its closure. EPA noted that it did not have the authority to enforce the state consent order, and did not have resources to carry out a comprehensive review of activities carried out by a party which had refused to enter an enforceable consent order with EPA. EPA's comments were offered only as "comments and an indication of the standards against which the Site closure may be evaluated by EPA in the future." EPA again reiterated its position and set forth in detail its concerns about L&RR's closure in a letter dated November 1, 1985, identifying specifically the lack of a cap in the area which EPA now proposes to cap. This letter was sent to L&RR before completion of the closure. In summary, the record clearly indicates EPA's disapproval with the closure conducted by L&RR to date.

d. Comment:

The RI/FS forgets to mention that the Superior Court of the State of Rhode Island has retained jurisdiction over the Site. With due respect to the EPA, no one has any authority to do anything to the L&RR Site except in conformity with the terms and conditions of that Court Order. While federal courts generally have jurisdiction in Superfund cases, it is doubtful that a federal court would intrude on the existing exercise of state court jurisdiction, given the doctrine of comity, notions of estoppel, and the conclusion of the RI/FS that neither groundwater nor the surface water nor the sediments pose a threat to public health.

EPA Response:

The state proceedings have not deprived EPA of the authority to carry out response actions or take enforcement under CERCLA. In fact, CERCLA §122(e)(6) specifically prohibits any responsible party from undertaking any remedial action without authority from EPA after EPA has commenced an RI/FS. Thus, L&RR may not carry out further remedial action without federal approval.

e. Comment:

There are several inaccuracies regarding the history of the Site in the RI/FS Report. This comment is intended to correct some of them.

L&RR's landfill license was up for renewal as of December 1, 1980 and L&RR filed a timely renewal application. Since L&RR had made a timely and sufficient application for the renewal of its license, its existing license did not expire. Its application was finally determined by the department at the end of October 1981 and pursuant to G.L. 42-35-14(b), the reviewing court in successive orders continued the license in effect through mid-January 1985.

On November 9, 1981, L&RR ceased operating in response to a RIDEM order. L&RR went to court to get a court order. L&RR ceased operations from November 9, 1981 until December 28, 1981, at which time the Superior Court of the State of Rhode Island ruled. The Court ruled that the RIDEM decision dated October 30, 1981 was "replete with procedural and substantive anomalies of grave proportions" and issued a court order allowing L&RR to continue to operate. L&RR resumed operation that afternoon.

The RIDEM tried to appeal the Superior Court order but was not successful. At that juncture, the RIDEM issued a second order against L&RR to cease operations. L&RR went to court and asked to have the RIDEM held in contempt. On January 20, 1982, the Superior Court of the State of Rhode Island held the RIDEM in contempt and issued an order that L&RR could continue to operate under the supervision and jurisdiction of the State of Rhode Island. The RIDEM on or about January 22, 1982 withdrew its second order. However, L&RR remained under the supervision and jurisdiction of the court which is in effect today. L&RR closed pursuant to a Superior Court order issued on July 13, 1983 which allowed L&RR to continue operating through mid-January 1985. As January 1985 approached, there was a dispute as to whether certain conditions set forth in the court order would allow L&RR to stay open longer than the date originally planned for, which was January 13, 1985. L&RR and the RIDEM brought this to the attention of the court before that date. Court hearings were held, at the close of which on January 20, 1985 the court ruled that the conditions justifying L&RR staying open further had not been met and L&RR was ordered to close in conformity with the previous court order, which it did.

EPA Response:

EPA acknowledges this information and entered it into the Administrative Record.

2. Applicable or Relevant and Appropriate Requirements (ARARs)

a. Comment:

The 1983 Court Order have extraordinarily strong bearing on what are the applicable and relevant and appropriate standards by which this Site should be judged. CERCLA indicates that ARARs are supposed to be site-specific. There is hardly anything more site-specific than a Court Order in a contested case determining what is environmentally sound for this Site. Therefore, as a matter of law, that Court Order sets forth the applicable and relevant and appropriate standards.

EPA Response:

CERCLA §121 establishes the clean-up standards to be met under CERCLA. A court order is not a "promulgated standard, requirement, criteria or limitation" which must be met by a CERCLA remedial action. Section 121(d)(c)(iii) specifically requires that state ARARs be of "general applicability", and be based on "hydrologic, geologic, or other relevant considerations." Moreover, §121 does preclude imposition of more stringent federal standards where state clean-up standards are less stringent than relevant federal ones.

b. Comment:

The RI/FS Report discusses applicable Rhode Island regulations governing covers for hazardous waste sites and specifically a cover thickness requirement of 24 inches. However, the 1983 Court Order contains a statement by the Rhode Island Department of Environmental Management and its Director that they accept and approve this Court Order and Agreement, "as full compliance with and fulfillment of any and all requirements of all applicable rules, regulations, and statutory provisions under the jurisdiction of the RIDEM and the Director". This statement negates the RI/FS Report's claim that state ARARs require more.

EPA Response:

EPA finds the 24-inch cover requirement to be "relevant and appropriate," even if it is not "applicable" because of RIDEM's settlement with L&RR. See also preceding responses.

c. Comment:

The RI/FS assumes that the RCRA standards are "relevant and appropriate" to the entire Site. However, that fact is not substantiated by the record. It is particularly not substantiated with regard to the steeper slopes. The RCRA standards are applicable to hazardous waste sites. The RI/FS states that hazardous waste was placed in one area of the landfill and covered with a synthetic cover in 1979. More trash was placed on top of this area and then another synthetic cover was placed pursuant to the 1983 Court Order. Therefore, the RCRA standards are not relevant and appropriate.

EPA Response:

EPA finds that the RCRA requirements are relevant and appropriate at this Site because they address problems or situations that are sufficiently similar to those at other hazardous waste sites. There is information that clearly indicates that hazardous wastes was disposed of at the Site. However, there is no definitive information regarding the location of the hazardous waste. The Site owner states that hazardous waste was co-disposed in the north-central area of the Site and covered with a synthetic cover in 1979. Other reports in the Administrative Record indicate that this may not be entirely correct. Information regarding the existing condition of the cover installed in 1979 is not available. Information regarding the hydrologic flow within the landfill is also not available. Channelized flow could result in infiltration from uncovered landfill areas impacting areas containing hazardous waste. RCRA Subtitle C regulations for closure of landfills are well suited to address the situation at this Site and must be applied to the entire landfill.

In addition, CERCLA is concerned with preventing a release of "hazardous substances" and the closure standard in the RCRA regulations is designed to prevent the release of "hazardous constituents." The hazardous waste is not necessarily the only source of hazardous substances or hazardous constituents. EPA therefore believes that the RCRA clousre performance standard should apply to the entire landfill. EPA also believes that extension of the synthetic cover would be required under other closure standards applicable to solid waste landfills including RCRA Subtitle D, the Rhode Island Solid Waste Management Act and Rhode Islands's Groundwater Protection Act.

d. Comment:

The key date in the analysis of relevant and appropriate requirements is July 13, 1983, the date the Superior Court of the State of Rhode Island determined what would be the appropriate way to close the Site in "an environmentally sound manner." The RI/FS Report sets forth the laws, regulations, and guidances it relied on. Virtually all of them were adopted after that date. There already was a remedial action in effect on July 13, 1983, before any of these things took effect. The issue of the appropriate remedial action has already been determined in a contested case by a court of competent jurisdiction in 1983. Therefore, amendments to the federal law after the fact are not relevant.

EPA Response:

Nothing in CERCLA §121 supports the contention that standards adopted after the settlement of a state enforcement action are not relevant and appropriate.

3. **Landfill Gas Emissions and the Risk Assessment**

a. Comment:

The report concludes that five million dollars must be spent on the steep side slopes because of the risk to the public from air emissions. However, the report never tested the air emissions from the side slopes. Therefore, there is no evidence in the record to substantiate that conclusion.

EPA Response:

The RI/FS report does not state that five million dollars must be spent on the steep side slopes because of the risk to the public from air emissions. The work on the steep side slopes is primarily being conducted to protect the groundwater and the wetlands. The synthetic cover proposed will also enhance the treatment of the gases from the vents which poses a potential risk to public health. Detailed information on the cost analysis is presented in Appendix BB of the RI/FS Report. It is clearly stated that the cost for the work on the steep side slopes is estimated to be between $600,000 and $700,000.

4. **Remedial Alternatives Analyzed**

a. Comment:

The RI/FS Report's repeated reference to the no-action alternative as meaning no remedial action is a material misstatement of fact. There already is a court-approved remedial action in place.

EPA Response:

In conducting an RI/FS according to the NCP, EPA must evaluate what is referred to as the "no action" alternative. The evaluation of the no action alternative provides EPA with information regarding the risks posed to human health and the environment if no remedial actions are conducted at the Site. In the case of L&RR, the Site owner had conducted work at the Site prior to completing an RI/FS. The "no action" alternative evaluated by EPA considered the work conducted by the Site owner at the time of completion of the RI/FS.

5. **EPA's Proposed Plan**

a. Comment:

Under CERCLA Section 121, even if RCRA standards were relevant, no remedy can be approved unless it is "cost-effective". This proposal patently is not. The RI/FS Report states that, "On the basis of an assessment of existing site hydrogeologic and chemical data, the groundwater, surface water, and sediments do not pose a threat to public health." Given the fact that there is already a remedy in place and the remedy is working, it is not obvious in any manner whatsoever how spending an additional five million dollars could be cost-effective.

EPA Response:

As discussed in many responses previously, the selected remedy and specifically the synthetic cover is intended to protect the groundwater. Although groundwater impacts are not evident to date, it is possible that a groundwater contaminant plume may emerge in the future. EPA must chose a remedy that is protective of human health and the environment, meets ARARs, is cost effective and utilizes permanent solutions to the maximum extent practicable.

b . Comment:

The RI/FS Report argues that one small part of the Site does not minimize infiltration. However, from the point of view of the entire Site, the Site as a whole minimizes infiltration. If the landfill owner had not put a cover over 80% of the Site pursuant to the 1983 Court Order and Consent Order and Agreement, we would find ourselves in a situation today where we would have to determine over what part of the Site it would be cost-effective to put a liner. The only logical conclusion that could be reached would be that the only cost-effective area for placing a liner is the identical area where the liner now exists. Consequently, had no liner ever been put down, a report done today would conclude that placing a liner over 80% of the Site would effectively minimize infiltration.

EPA Response:

The RCRA Subtitle C regulations in 40 CFR § 264.310 are relevant and appropriate at the L&RR Site. These regulations, among other provisions, require an owner or operator at final closure to cover the landfill with a final cover designed and constructed to provide long-term minimization of liquids through the closed landfill. L&RR chose to close the landfill by capping approximately 80% of the landfill surface area with a synthetic cover. This leads one to conclude that L&RR felt that a synthetic cover was a practical solution to reducing infiltration to the landfill. EPA believes that to reduce the infiltration to the smallest amount, requires a synthetic cover over the remaining 20% of the landfill surface area. A synthetic cover over the entire landfill will attain a standard of performance equivalent to the RCRA Subtitle C closure standard and assure protection of human health and the environment.

c. Comment:

With regard to a methane recovery system, we note that the 1983 Court Order requires a methane recovery system. There is no reason for EPA to get involved in that because the state already has that within its jurisdiction. Furthermore, on February 11, 1987, L&RR, Inc., entered into a contract with O'Brien Energy Systems, Inc., for the installation of a methane recovery system at the Site. The RI/FS establishes that once that system is in place, it will remedy any air problem, if there is one.

EPA Response:

Section 122(e)(6) of CERCLA specifically prohibits any responsible party from undertaking any remedial action without authority from EPA after EPA has commenced an RI/FS. Thus, L&RR may not carry out further remedial action without federal approval. Due to the potential risks posed by the landfill's gaseous emissions, this system must be implemented in accordance with EPA's Record of Decision and meet EPA's approval.

The RI/FS Report does not establish that any particular methane recovery and removal system will remedy air pollution problems. The RI/FS evaluated technologies that are capable of reducing the gaseous landfill emissions to the levels necessary to protect public health. Since EPA has not evaluated a specific design, it is not clear that the O'Brien Energy Systems, Inc., gas control system will achieve the emissions reductions necessary to meet the standard set by EPA's Record of Decision (ROD).

IV. REMAINING CONCERNS

At the public informational meeting held in North Smithfield on July 19, 1988, and at the informal public hearing held on August 10, 1988, local residents raised issues of concern for the L&RR Site regarding the design and implementation phase of EPA's selected remedy. The principle issues are described below, along with statements about how EPA intends to address these concerns.

1. Groundwater

Citizens continue to be very concerned that a contaminant plume may form in the groundwater beneath the landfill and fail to be detected by the existing monitoring wells. They are concerned that their residential wells may become contaminated as a result.

As a result of this concern, EPA once again reviewed the hydrologic and geologic information for the Site and established a groundwater monitoring plan that would detect a groundwater plume emerging from the Site. As part of this new plan, a new cluster of wells, consisting of two new wells at different depths, will be installed between existing clusters CW-6 and CW-7.

2. Landfill Owner's Role in Implementing the Remedy

Citizens feel strongly that the cleanup would not be conducted thoroughly by the landfill owner. In particular, citizens are concerned about the landfill owner possibly operating the landfill gas treatment system.

According to the law, EPA must negotiate with the responsible parties for conducting the remedial action. If the responsible parties agree to implement the selected remedy in accordance with CERCLA, EPA will monitor the design and construction to insure that it is protective of public health and the environment. Furthermore, the selected remedy includes an air monitoring program to insure that during operation the selected remedy remains protective.

ATTACHMENT A

COMMUNITY RELATIONS ACTIVITIES
AT THE
LANDFILL AND RESOURCE RECOVERY SITE
IN NORTH SMITHFIELD, RHODE ISLAND

Community relations activities conducted at the Landfill and Resource Recovery Superfund Site (L&RR Site) have included the following:

- 1983 -- EPA released a community relations plan describing citizen concerns about the L&RR Site and outlining a program to address these concerns and to keep citizens informed about and involved in Site activities.
- October 1986 -- EPA revised the community relations plan to reflect changes in the level of community concern and to plan activities designed to meet new community needs.
- January 1987 -- EPA held an informational meeting to present to the community EPA's plans for a Remedial Investigation and Feasibility Study (RI/FS) at the L&RR Site.
- July 1988 -- EPA arranged for the publication of two public notices in the Providence Journal and the Woonsocket Call announcing a public informational meeting and describing EPA's Proposed Plan for addressing contamination at the L&RR Site.
- July 1988 -- EPA mailed the Proposed Plan announcing EPA's preferred alternative for addressing contamination at the L&RR Site to all parties on EPA's site mailing list.
- July 19, 1988 -- EPA held an informational public meeting to discuss the results of the RI/FS and to present EPA's Proposed Plan for the Site.
- July 20 - September 2, 1988 -- EPA held a six-week public comment period to accept public comments on the FS alternatives and the Proposed Plan. The six week comment period included a three-week extension that EPA held to allow additional time for interested parties to participate in the remedy selection process.
- August 10, 1988 -- EPA held an informal public hearing to accept oral comments on the remedial alternatives evaluated in the FS and on EPA's Proposed Plan.

APPENDIX B

ADMINISTRATIVE RECORD INDEX

Landfill & Resource Recovery Site

Not included.

APPENDIX C

STATE CONCURRENCE LETTER

Landfill & Resource Recovery Site

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management
OFFICE OF THE DIRECTOR
9 Hayes Street
Providence, R.I. 02908

September 27, 1988

Mr. Michael Deland
E.P.A. Region I
J.F. Kennedy Federal Building
Boston, Massachusetts 02203

Dear Mr. Deland:

I am writing concerning EPA's proposed plan for remediation at the Landfill and Resource Recovery Site (L&RR) in North Smithfield, Rhode Island.

This Department concurs with those portions of the proposed plan which are consistent with the closure requirements outlined in the 1988 Solid Waste Consent Order and Agreement between RIDEM and L&RR, Inc. We understand your laws and regulations may require more stringent remedial actions and it appears the additional components of your proposed remedy, although more protective, are not inconsistent with the closure measures required by the State's consent agreement.

Very truly yours,

Robert L. Bendick, Jr.
Director

RLB/ms
cc: Tom Getz
0652B